NAVAL LOGISTICS INTEGRATION THROUGH INTEROPERABLE SUPPLY SYSTEMS

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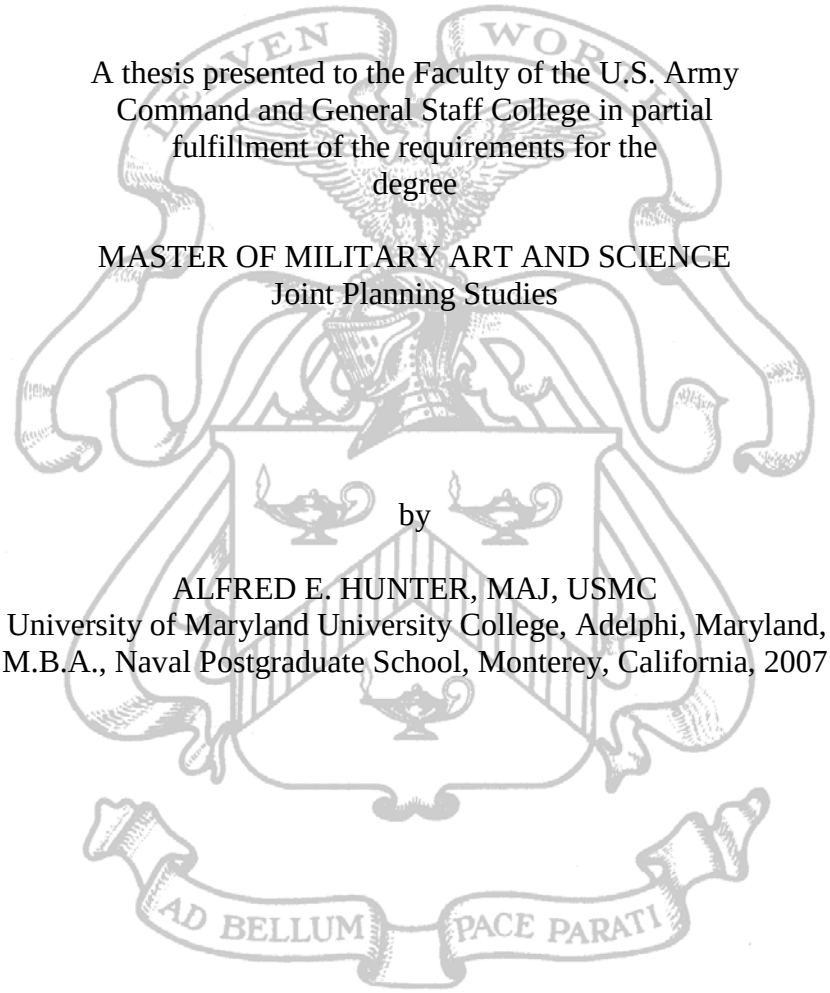
by

ALFRED E. HUNTER, MAJ, USMC
B.A., University of Maryland University College, Adelphi, Maryland, 2001
M.B.A., Naval Postgraduate School, Monterey, California, 2007



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This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable supply systems. The Navy and Marine Corps emphasize the integration of policy, doctrine, business processes, technologies, and systems as an enabler to strategic concepts such as Seabasing. Scholarly research indicates that systems such as the Global Combat Support System-Marine Corps (GCSS-MC) and Navy Enterprise Resource Planning (ERP) will enable the Navy and Marine Corps to achieve interoperability with each other and the Joint force. While there is an abundance of literature pertaining to the theory of interoperability, nothing has been written that demonstrates interoperability between the Navy and Marine Corps supply systems. Using a problem solving approach, interoperability tests involving GCSS-MC, Navy ERP, Web- Standard Automated Logistics Tool Set (SALTS), and Navy One Touch Support (OTS) were conducted to confirm whether or not the Defense Automated Addressing System (DAAS) could be used to facilitate interoperability between these systems. Results of interoperability tests between GCSS-MC, Navy ERP, Web-SALTS, and Navy OTS suggest that DAAS can facilitate interoperability between supply systems. This research is significant because it provides actual test results with a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. This research also provides recommendations on how improve interoperability between GCSS-MC, Navy ERP, and other Joint supply systems.

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THESIS APPROVAL PAGE

Name of Candidate: Major Alfred E. Hunter

Thesis Title: Naval Logistics Integration through Interoperable Supply Systems

Approved by:

_____, Thesis Committee Chair
Daniel Gilewitch, Ph.D.

_____, Member
Ken Long, Ph.D.

_____, Member
Michael E. Weaver, M.A.

Accepted this 13th day of June 2014 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

NAVAL LOGISTICS INTEGRATION THROUGH INTEROPERABLE SUPPLY SYSTEMS, by Major Alfred E. Hunter, USMC, 127 pages.

This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable supply systems. The Navy and Marine Corps emphasize the integration of policy, doctrine, business processes, technologies, and systems as an enabler to strategic concepts such as Seabasing. Scholarly research indicates that systems such as the Global Combat Support System-Marine Corps (GCSS-MC) and Navy Enterprise Resource Planning (ERP) will enable the Navy and Marine Corps to achieve interoperability with each other and the Joint force. While there is an abundance of literature pertaining to the theory of interoperability, nothing has been written that demonstrates interoperability between the Navy and Marine Corps supply systems. Using a problem solving approach, interoperability tests involving GCSS-MC, Navy ERP, Web- Standard Automated Logistics Tool Set (SALTS), and Navy One Touch Support (OTS) were conducted to confirm whether or not the Defense Automated Addressing System (DAAS) could be used to facilitate interoperability between these systems. Results of interoperability tests between GCSS-MC, Navy ERP, Web-SALTS, and Navy OTS suggest that DAAS can facilitate interoperability between supply systems. This research is significant because it provides actual test results with a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. This research also provides recommendations on how improve interoperability between GCSS-MC, Navy ERP, and other Joint supply systems.

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ACRONYMS

ADA	Antideficiency Act
Ao	Operational Availability
ARG	Amphibious Readiness Group
AV	Asset Visibility
CONUS	Continental United States
DAAS	Defense Automated Addressing System
DBASE	DLA Transaction Services Baseline Environment
DDATA	DoD Data Services
DGATE	DoD Gateway
DLA	Defense Logistics Agency
DLMS	Defense Logistics Management System
DLSS	Defense Logistics Standard System
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DOD	Department of Defense
DODAAC	Department of Defense Activity Address Code
DOS	Days of Supply
EBUS	DoD eBusiness Gateway
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
FLC	Fleet Logistics Center
GCSS-MC	Global Combat Support System-Marine Corps
HQMC	Headquarters Marine Corps
I&L	Installations and Logistics

ICP	Inventory Control Point
IGC	Integrated Data Environment (IDE)/Global Transportation Network (GTN) Convergence
IT	Information Technology
JITC	Joint Interoperability Test Center
LOGMOD	Logistics Modernization
MADT	Mean Administrative Delay Time
MAGTF	Marine Air Ground Task Force
MDT	Mean Down Time
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MILSBILLS	Military Standard Billing System
MILSTRAP	Military Transaction Reporting and Accountability Procedures
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MLDT	Mean Logistics Delay Time
MLG	Marine Logistics Group
MMDC	Marine Air Ground Task Force Materiel Distribution Center
MOADT	Mean Outside Assistance Delay Time
MRO	Material Release Order
MSRT	Mean Supply Response Time
MTBM	Mean Time between Maintenance
NAVSUP	Naval Supply Systems Command
NLI	Naval Logistics Integration
NMCB	Naval Mobile Construction Brigade

OCONUS	Outside the Continental United States
OTS	One Touch Support
RIC	Routing Identifier Code
SALTS	Standard Automated Logistics Tool Set
SMU	Supply Management Unit
STRATIS	Storage Retrieval Automated Tracking Integrated System
TRANSCOM	Transportation Command

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CHAPTER 1

INTRODUCTION

Introduction

In 2011, the Secretary of the Navy reaffirmed a commitment for the Navy and Marine Corps to achieve Naval Logistics Integration (NLI) by "integrating policy, doctrine, business processes, technologies, and systems to optimize logistics performance in support of future operations" (Secretary of the Navy 2011, 3). In the past, the Navy and the Marine Corps have used different ground supply systems that were not interoperable. However, the Navy and Marine Corps have both replaced their respective legacy systems with systems that have the potential of communicating with each other. The following two scenarios highlight: (1) why NLI is such an important initiative and (2) why interoperability is essential to NLI.

Scenario 1

Imagine that the 4th Naval Mobile Construction Battalion (NMCB) (also referred to as the Navy Seabees) is attached to a Marine Expeditionary Brigade (MEB). The MEB's principal supply support organization, the Supply Management Unit (SMU), is tasked with providing supply support. This means that the SMU is responsible for providing repair parts and resources to all units within the MEB including the Seabees. The SMU and all other Marine Corps units use Global Combat Support System-Marine Corps (GCSS-MC) to plan and execute supply and maintenance operations. Conversely, the Navy Seabees use Navy One Touch Support (OTS) to locate, requisition, and track sustainment. The SMU and the Navy Seabees are unaware that GCSS-MC and Navy OTS are interoperable and that the Navy Seabees can use Navy OTS to requisition items

from the SMU's inventory who uses GCSS-MC. Accordingly, the Navy Seabees continue to requisition the items from the Defense Logistics Agency (DLA) or Navy sources of supply even though the SMU often has the needed items close by in the SMU's inventory.

Scenario 2

The 31st Marine Expeditionary Unit (MEU) is embarked with the Navy as part of an Amphibious Readiness Group (ARG). The MEU deployed with its usual 15 Days of Supply (DOS). However, the majority of the MEU's inventory is stored in inaccessible storage locations on the ship. Just prior to the deployment, the MEU and the ARG established agreements and manual procedures for the MEU to obtain support from the Navy's stocks held aboard the ship while underway. After reviewing the inventory records, the MEU determined that a specific item was needed, but was not available in the Navy stocks aboard the ship or in the MEU's containers. However, the MEU used Transportation Command's (TRANSCOM) Integrated Data Environment (IDE)/Global Transportation Network (GTN) Convergence (IGC) Asset Visibility (AV) system and was able to locate the item at a nearby Fleet Logistics Center (FLC). The FLC stores the Navy's wholesale inventory along with other DLA items. In the past, the MEU used Web- Standard Automated Logistics Tool Set (SALTS) or Navy One Touch Support (OTS) to requisition from the Navy, which is considered by the Marine Corps as a form of off-line requisitioning. Off-line requisitioning is highly discouraged by the Marine Corps as it is difficult to financially track the expenditures and record historical usage necessary for inventory planning. This presents the risk of over-spending a unit's budget

and could lead to an Antideficiency Act (ADA) violation.[1] Moreover, off-line requisitioning creates duplicate records in the Marine Corps parent system, GCSS-MC. Duplicate records result in system errors that are time-consuming and costly to correct. However, the MEU is not sure whether or not GCSS-MC is interoperable with the Navy's wholesale supply system; namely Navy Enterprise Resource Planning (ERP). As a result, the MEU decides to use Navy OTS to requisition from the Navy, reconcile financial records daily, and fix the problems created in GCSS-MC at a later time.

Problem Statement

Although hypothetical, these two scenarios address a specific capability gap that exist between the Navy and Marine Corps ground supply systems. Today, the Navy and Marine Corps ground supply systems operate independently of one another. Accordingly, the Navy and Marine Corps do not regularly use their own ground supply systems to obtain support from one another. Manual processes are established to obtain support from one another. However, this arrangement is suboptimal especially during high tempo operations with forces distributed over vast distances. Ideally, the Navy and Marine Corps should use integrated or interoperable ground supply systems to facilitate NLI. This research investigates how the Navy and Marine Corps (namely Navy OTS, Navy

[1]The Antideficiency Act "prohibits federal employees from: (a) making or authorizing an expenditure from, or creating or authorizing an obligation under, any appropriation or fund in excess of the amount available in the appropriation or fund unless authorized by law; (b) involving the government in any obligation to pay money before funds have been appropriated for that purpose, unless otherwise allowed by law; (c) accepting voluntary services for the United States, or employing personal services not authorized by law, except in cases of emergency involving the safety of human life or the protection of property; (d) making obligations or expenditures in excess of an apportionment or reapportionment, or in excess of the amount permitted by agency regulations" (Government Accountability Office 2014).

ERP, and GCSS-MC) can ensure that the ground supply systems are in fact interoperable. This research also provides recommendations on how interoperability can enable GCSS-MC and Navy ERP to work reliably together under combat conditions.

Primary Research Question

How can the Navy and the Marine Corps increase the interoperability between ground supply systems to increase Naval Logistics Integration?

Secondary Research Questions

1. To what extent are the Navy and the Marine Corps ground supply systems interoperable?
2. How can the Defense Automated Addressing System (DAAS) facilitate interoperability between the Navy and Marine Corps ground supply systems?
3. What are the alternatives to DAAS that may increase interoperability between the Navy and Marine Corps ground supply systems?
4. From a relative cost and efficiency perspective, what are the advantages and disadvantages of increasing interoperability between the Navy and Marine Corps ground supply systems?

Assumptions

1. NLI will remain a key strategic initiative for the Navy and the Marine Corps.
2. NLI facilitates strategic concepts such as Sea-basing and Expeditionary Maneuver Warfare.
3. Interoperable ground supply systems facilitate NLI.
4. The Defense Automated Addressing System (DAAS) facilitates interoperability between GCSS-MC, Navy ERP, and other joint supply systems.

Definition of Terms

A glossary is provided on page 70 as part of this research to define military terms, ordinary terms used in different context, abstract terms, and shorthand terms used to shorten lengthy phrases. Footnotes are also used to define terms or further clarify points.

Limitations

The time available to conduct this study is six months. This study depends heavily on strategic guidance, policy documents, published research, previous tests, and current practices. This research only evaluates ground supply and maintenance systems used by the Navy and Marine Corps. Specifically, this research only tests specific capabilities associated with GCSS-MC, Navy ERP, Navy OTS, and Web-SALTS. This is an unfunded project.

Scope and Delimitations

This research investigates how the Navy and the Marine Corps could increase NLI through interoperable ground supply systems. This research qualitatively evaluates interoperability increases based upon confirmation that the Navy and Marine Corps principal ground supply systems (i.e., GCSS-MC and Navy ERP) are capable of processing each other's requisitions via DAAS. This thesis examines the benefits of interoperability and determines how DAAS facilitates interoperability between the Navy and Marine Corps ground supply systems; it research assesses policy, doctrine, business processes, technologies, and systems.

In Appendices A and B, the Navy and Marine Corps logistical systems are listed along with a brief description. However, this research only tests specific capabilities associated with GCSS-MC, Navy ERP, Navy OTS, and Web-SALTS for the purpose of

confirming interoperability between ground supply systems via DAAS. GCSS-MC is the principal system the Marine Corps uses for ground supply and maintenance. Navy ERP is the Navy's principal system for supply and financial management. Navy OTS and Web-SALTS are additional systems the Navy uses for requisitioning. For this research, GCSS-MC, Navy ERP, Navy OTS, and Web-SALTS are sufficient to confirm that DAAS facilitates interoperability. Presently, the Navy and Marine Corps use the same aviation supply and maintenance systems. Therefore, aviation supply and maintenance systems will not be considered in this research.

Significance of the Study

The Navy and Marine Corps recognize the need for interoperable ground supply systems. Presently, within the Continental United States (CONUS), the Navy and Marine Corps can rely on abundant inventories, a stable supply chain, and reliable delivery timeframes. With the declining budgets, there is a need to conserve resources. Accordingly, it may not seem reasonable to invest in making ground supply systems more interoperable when the Navy and Marine Corps are presently capable of obtaining timely and reliable support from DLA. However, in a deployed environment, inventory consumption can be rapid, the supply chain is often unpredictable, and deliveries may take weeks and even months to arrive. Thus, the ability for deployed military units to requisition commonly used and often critical items from other local units (regardless of the military service) may contribute to sustained readiness and a significant cost savings with regards to expediting shipments and storing inventory.

This research demonstrates interoperability between some of the Navy and the Marine Corps ground supply systems. Moreover, this research presents additional

opportunities for Joint logistics interoperability with the other military services (i.e., Army, Coast Guard, and the Air Force). Lastly, this research facilitates strategic concepts such as Naval Logistics Integration, Sea-basing, and Expeditionary Maneuver Warfare.

Author's Qualifications

The author's Military Occupational Specialties (MOS) are Ground Supply Officer, Materiel Management Officer, and Acquisition Professional Candidate. He has relevant work experience from three different intermediate-level supply support organizations, including inventory planning, inventory management, financial management, customer service, systems management, warehouse management, operations management, and distribution management. This includes intermediate-level supply support in both garrison and combat environments. He also worked at the GCSS-MC Program Management Office as the Supply Process Team Officer-in-charge throughout the design, development, test, demonstration, and implementation phases. He is Defense Acquisition Workforce Improvement Act (DAWIA) Level II certified in Life Cycle Logistics, Level I certified in Program Management, and has completed all educational requirements for Level III certification in Life Cycle Logistics and Program Management.

Summary

This chapter provided two scenarios that emphasized why: (1) why NLI is such an important initiative and (2) why interoperability is essential to NLI. Although hypothetical, these two scenarios addressed a specific capability gap that exists between the Navy and Marine Corps ground supply systems. Based upon a framed problem, research questions were developed along with some key assumptions. These research

questions drive the literature review in chapter 2. In chapter 2, an exhaustive research of literature is conducted in order to determine the current Navy and Marine Corps paradigms and to identify a gap in the body of knowledge.

CHAPTER 2

LITERATURE REVIEW

Introduction

This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable ground supply systems. This chapter describes interoperability with emphasis on how it relates to NLI, GCSS-MC, Navy ERP, and DAAS. Next, it briefly discusses the subject of operational availability to demonstrate how interoperable ground supply systems may lead to increased readiness. Then, it discusses NLI to set the context for why interoperability between the Navy and Marine Corps ground supply systems is important. After that, it describes DAAS, interfaces, and web services as key enablers to interoperability between the Navy and Marine Corps ground supply systems. Then, it briefly discusses supply management and how it relates to NLI and interoperability. Finally, it identifies a gap in the literature.

Interoperability

Interoperability is essentially the ability for people, organizations, systems, or equipment to operate effectively together by communicating and acting upon shared information (Joint Chiefs of Staff 2000; Joint Chiefs of Staff 2012; Sessions and Jones 1993; van Lier and Hardjono 2011). The parallel development of doctrine, procedures, and training facilitates interoperability (Joint Chiefs of Staff 1992; Sessions and Jones 1993). Technology is an enabler to achieving interoperability. Data is mutually shared between systems and applications. Applications convert data into meaningful information that enables mutual understanding (Sessions and Jones 1993).Technology uses common

standards and protocols to exchange information (Sessions and Jones 1993). The ability to share and act upon shared information enables people, organizations, systems, or equipment to synchronize efforts, reduce friction, and provide mutual support.

From a logistics perspective, lack of system interoperability at the tactical, operational, and strategic levels results in inefficient supply chain management across the battlefield (Scott 2005). Logistics systems that are not interoperable create barriers that inhibit military units from accessing logistical support or supporting other military units (Nilsen et al. 2004). Accordingly, systems such as GCSS-MC and Navy ERP were developed to ensure interoperability between the Navy, Marine Corps, and Joint services (Joint Chiefs of Staff 2000; Joint Chiefs of Staff 2013). Both systems use standards and protocols set forth by the Defense Logistics Management Standards (DLMS) that stipulate how to communicate with other systems (Department of Defense 2012a; Department of Defense 2012b; Department of Defense 2012c; Department of Defense 2012d).

Interoperable ground supply systems might reduce procurement lead times in combat environments and other hard-lift areas by enabling military units to source items from nearby units instead of DLA.[2] For example, in a hard-lift area such as Kuwait or Bahrain, DLA takes approximately 14 days to ship a high priority item by air (Defense Logistics Agency 2009).[3] However, if a unit sources an item locally from another unit,

[2]A hard-lift area is a geographic location that has either no scheduled service from the Continental United States (CONUS), infrequent service, or seasonal service.

[3]Shipment times based upon the Force/Activity Designator (F/AD) and Urgency of Need Designator (UND) are provided in Appendix H. DLA's Time Definite Delivery standards for shipments are provided in Appendix I.

then procurement lead time can be reduced from 14 days to practically minutes depending on the supply system's capabilities (e.g., near real-time processing).[4] Moreover, the requesting unit can avoid incurring expensive transportation costs associated with expediting shipments.[5]

Transportation can be costly in a deployed environment. For example, in 2003, the Department of Defense (DOD) obligated $28.1 billion towards Operation Iraqi Freedom (Government Accountability Office 2003). Of the $28.1 billion obligated, $14.2 billion was for services and $4.9 billion was for transportation costs associated with moving personnel and equipment over long distances in an austere desert environment (Government Accountability Office 2003).

Despite this investment, at least $1.2 billion worth of materials were lost in transit and hundreds of pallets and containers of material were back-logged at various distribution centers (Government Accountability Office 2003). Millions worth of containers were lost or damaged and in-transit visibility was poor (Government Accountability Office 2003). Compounding these problems were logistics systems were not interoperable (Government Accountability Office 2003; United States Marine Corps

[4]Procurement lead time is "the span of time from the date of order to receipt of the shipment in the inventory. This includes (a) administrative lead time from the date that a decision is made to initiate an order to the receipt of the order by the supplier; (b) production lead time or the time from receipt of the order by the supplier to completion of the manufacture of the item ordered; and (c) delivery lead time from completion of the manufacture to receipt of the item in the inventory" (Blanchard 2004, 110).

[5]Appendix H provides information pertaining to procurement lead times based upon a unit's mission and urgency of need. Appendix I provides DLA's Time Definite Delivery standards. Collectively, Appendices H & I help to understand how long shipments may take depending on a unit's mission, urgency of need, and geographic location and why interoperable supply systems may alleviate these timeframes.

2011c). Accordingly, equipment was cannibalized due to parts shortages which further degraded equipment readiness (Government Accountability Office 2003). A lack of faith in the supply chain resulted in circumventing normal supply procedures, while repeatedly requesting the same items contributing to costly excess inventory accumulated throughout the supply chain (Government Accountability Office 2003).

Operation Iraqi Freedom is a prime example of why interoperability between supply systems is important. Although the lack of in-transit visibility and poor distribution were key factors to logistical problems in Iraq, interoperability between supply systems deserves consideration. If units had total asset visibility of all retail inventories across the battlefield and the ability to requisition items from any unit regardless of the systems used, then units may have been able to overcome supply chain setbacks without resorting to cannibalization and repeated requisitioning of the same items. Thus, increasing interoperability between supply systems is an operational imperative for maintaining efficiency and effectiveness on the battlefield.

Operational Availability

The Navy uses Operational Availability (Ao) to measure material readiness for weapon systems and equipment (Department of the Navy 2003). Operational Availability is "the probability that the system is capable of performing its specified function when called for at a random point in time" (Department of the Navy 2003, 65). Operational Availability is expressed as

$$Ao = \frac{MTBM}{MTBM + MDT}$$

where MTBM (or Mean Time between Maintenance) translates to a system's uptime and MDT (or Maintenance Down Time) translates to a system's downtime (Blanchard 2005; Department of the Navy 2003; Frohne 2008; Jones 2006; Jones 2007). MTBM is measurement of system reliability whereas MDT is the total elapsed time required to repair and restore a system to full operating status (Department of the Navy 2003). MDT consists of Mean Active Maintenance Time (M) and Mean Logistics Delay Time (MLDT) (Department of the Navy 2003). MLDT is the maintenance downtime that is expended as a result of logistics delays including transportation, Mean Supply Response Time (MSRT), Mean Administrative Delay Time (MADT), and Mean Outside Assistance Delay Time (MOADT) (Department of the Navy 2003). Since MSRT is the average portion of downtime awaiting receipt of spare components, MSRT is typically the cause of a prolonged MLDT (Department of the Navy 2003).

In general, there are two ways to improve operational availability. The first method is to improve the overall reliability of the weapon system, which is essentially increasing the MTBM (Blanchard 2005; Jones 2006; Jones 2007). The second method is to decrease MDT (Blanchard 2005; Jones 2006; Jones 2007). As previously mentioned, there are different parts of MDT that can be decreased. For this research, only MSRT and how it can be decreased by improved inter-service support via interoperable ground supply systems will be considered. In this research, MSRT is referred to as procurement lead time; an alternate definition.

A contributing factor to prolonged procurement lead time is Diminishing Manufacturing Sources and Material Shortages (DMSMS). DMSMS is essentially when a manufacturer or supplier of an item either goes out of business or stops producing the

required item, which results in material shortages for item needed to maintain a weapon system in satisfactory condition (Department of Defense 2014). In situations where protracted procurement lead time is caused by DMSMS, tools such as IGC's AV are invaluable as it enables the timely location of available retail and wholesale inventory. Yet, finding the items is only part of the solution. The method for requisitioning the items also needs to be considered. Ideally, interoperable supply systems would enable a military unit to use its own supply system to requisition the item from another military unit or source of supply; regardless of the systems involved. Improved inter-service supply support via interoperable supply systems may contribute to reduced procurement lead time and improved readiness.

Naval Logistics Integration

Improving interoperability, inter-service support, and readiness are just a few reasons why Naval Logistics Integration (NLI) is an important strategic initiative for the Navy and the Marine Corps. NLI is also an enabler to Seabasing (Department of the Navy 2010c; United States Marine Corps, 2010; Secretary of the Navy 2011; Department of the Navy 2011b; Joint Chiefs of Staff 2012; Department of the Navy 2009d). Seabasing involves the Navy and Marine Corps using the sea as maneuver space to rapidly respond to world-wide contingencies and project and sustain combat power from the sea (Department of the Navy 2010c, 14). Seabasing contributes to global agility and extends operational reach by cleverly positioning forces that leverage prepositioned stocks and rapid expeditionary basing (Joint Chiefs of Staff 2012, 5). Seabasing is predicated upon the ability of joint, interagency, and international partners to support each other (Department of the Navy 2010c, 15). In a multi-national environment, it is

important to develop interoperable logistic concepts and doctrine to facilitate integrated and synchronized logistics (Joint Chiefs of Staff 2008, V-13). NLI is the Navy and Marine Corps concept for facilitating logistics integration.

NLI is an ongoing effort to enhance the Navy and Marine Corps ability to maintain a prolonged forward presence at sea via an integrated, reliable, and agile supply chain (Department of the Navy 2010c; United States Marine Corps 2010). Essential to the Navy and Marine Corps supply chain is the distribution system comprised of the Combat Logistics Force ships, Military Sealift Command support ships, intermediate advanced bases, and shore-based support facilities (e.g., Fleet Logistics Centers) (United States Marine Corps 2010). Collectively, these support activities enable the Navy and Marine Corps to sustain prolonged operations at sea (United States Marine Corps 2010).

Interoperability between people, organizations, places, systems, and processes are also fundamental (United States Marine Corps 2010). One of the key objectives of NLI is to make the Navy and Marine Corps logistics systems integrated or interoperable in order to enable efficiently project and sustain combat power from the sea (Department of the Navy 2011b). Currently, Headquarters Marine Corps are conducting research, experimentation, and war gaming of logistics systems to increase interoperability between the Navy and the Marine Corps (Kirk 2014). While interoperability is an acceptable and favorable interim approach, NLI is desired by the Navy and Marine Corps to facilitate Seabasing (United States Marine Corps 2010).

Another key objective of NLI is to implement the Navy and Marine Corps' best practices and develop partnerships with the Defense Logistics Agency (DLA), Transportation Command (TRANSCOM), and other services to enable better inventory

positioning and distribution (Department of the Navy 2011b). The Navy has already established a strategic partnership with the Defense Logistics Agency by allowing the Defense Logistics Agency to manage the Navy's owned and managed material at the Fleet Logistics Centers (Defense Logistics Agency 2014d). Specifically, the Navy turned over warehouse management responsibilities to the Defense Logistics Agency. In total, the Defense Logistics Agency now stores the Navy's inventories at eleven different Defense Logistics Agency distribution centers located globally.[6]

Additionally, NLI has another key objective worth mentioning. This objective is to increase asset the visibility of retail and wholesale inventories to timely inter-service supply support (Department of the Navy 2011b, 7). Asset visibility across the military services is currently a reality made largely possible through Transportation Command's (TRANSCOM) system titled, "Integrated Data Environment (IDE)/Global Transportation Network (GTN) Convergence (IGC)." Within TRANSCOM's system IGC, there is an application called "Asset Visibility" that provides global visibility of assets in all classes of supply to the Department of Defense, Military Services, Combatant Commands, and Joint Task Forces (Acquisition Community Connection 2014). This capability enables the Navy and Marine Corps to publish and research current inventory stock postures for potential sourcing. As the Distribution Process Owner, responsible for overseeing and managing the Department of Defense's distribution system, IGC is TRANSCOM's contribution to interoperability (Joint Chiefs of Staff 2008, II-7).

[6]On 7 February 2014, IGC Asset Visibility was used to research Naval Supply Systems Command's wholesale inventory. Research revealed the 100 percent of the Navy's wholesale inventory is stored and managed at Defense Logistics Agency (DLA) Distribution Points within the Fleet Logistics Centers. This suggests that the Navy has turned over warehouse operations for wholesale inventory to DLA.

The Navy and the Marine Corps are committed to working together to identify redundant warfighting capabilities and reduce costs (Secretary of the Navy 2011; Department of the Navy 2011a). Accordingly, the Navy and Marine Corps established an NLI Senior Board that meets quarterly to facilitate and champion NLI initiatives (Department of the Navy 2011b). The NLI Senior Board empowers Service Champions to develop, pursue and implement various NLI initiatives, while providing regular updates to the NLI Senior Board (Department of the Navy 2011).

The guiding principles of NLI are partnership, transformation, seabasing, change and risk management, and jointness (Department of the Navy 2011b, 5).

Together, the Navy and Marine Corps have had some notable successes with regards to NLI such as:

1. Developed and implemented a process which enabled Marine Corps requisition fulfillment from Amphibious Ready Group consumable supply inventories afloat.
2. Adopted Navy's Advanced Traceability and Control (ATAC) and Electronic Retrograde Management System (eRMS) as a naval solution for managing or retrograding repairables.
3. Developed common processes for managing Class II and Class VIII materiel (Truba and Hodge 2012, 11; Pallotta 2012).

As of 2012, there were 18 NLI initiatives underway and several others completed and fully implemented (Burt and Hodge 2012). The top five NLI initiatives are:

1. Naval Logistics IT Modernization Solution
2. Management of Class IX Repairables for Ground Equipment

3. Commonality of Spares on Littoral Combat Ships and National Security Cutters

4. OEF Reset Plans for Common Ground Equipment

5. Standardize Outfitting of Specialized Operations Teams (Burt and Hodge 2012, 10).

This research supports the first initiative by: (1) assessing whether or not the Navy and Marine Corps principal ground supply systems are interoperable and (2) providing recommendations on how to improve interoperability. Interoperable ground supply systems may facilitate the Navy and Marine Corps' integrated management of Class IX.

The future operating environment may require ingenious approaches to overcome recurring logistical challenges.

> Traditional approaches to logistics will not meet future military requirements. Not only will large logistics bases ashore be unacceptably vulnerable to enemy attack, but their size and immobility will also make them inoperable with the rapidly paced, highly mobile warfighting concepts being developed. Moreover, having large stocks of materials in-theater has proven to be no assurance that the combat forces will get the supplies they need, when they need them. (National Research Council 1999, 35)

Through NLI, the Navy and Marine Corps can improve supply chain flexibility, adaptability, and responsiveness. NLI may enable Marine Corps units, embarked with the Navy, to rapidly locate, source, and track assets from Navy supply sources rather than carrying around stockpiles of supplies. Similarly, NLI could enable Navy units, attached to Marine Corps units, to receive support from Marine Corps supply sources. NLI may be facilitated by the Defense Automated Addressing System (DAAS), which provides the infrastructure, policies, and procedures to enable interoperability between the Navy and Marine Corps ground supply systems.

Defense Automated Addressing System

DAAS is a core capability that enables interoperability between the military services, the Department of Defense, the Defense Logistics Agency, and various sources of supply. DAAS is managed by the Defense Logistics Agency's Transactions Services. Essentially DAAS is a "collection of accredited Automated Information Systems (AISs) that receive, validate, edit, route, archive, and transmit DoD logistics traffic" (Department of Defense 2012b, C1-1).

> Each DLA Transaction Services AIS is categorized under one of four profiles:
> 1. DLA Transaction Services Baseline Environment (DBASE)
> 2. DoD Data Services (DDATA)
> 3. DoD Gateway (DGATE)
> 4. DoD eBusiness Gateway (EBUS) (Department of Defense 2012b, C1-1).
>
> DBASE represents the infrastructure on which the applications operate; DDATA systems provide access to logistics data, reports, and data repositories; DGATE systems process transactions that are predominantly in the Defense Logistics Standard System (DLSS) (legacy 80 record position) format; and EBUS systems process transactions in the Defense Logistics Management System (DLMS) (X12 and extensible markup language (XML)) variable-length formats. (Department of Defense 2012b, C1-1)

Historically, the military services used DLSS to communicate transactions with DAAS (Department of Defense 2012b). The bulk of DLSS transactions communicated with DAAS consist of supply, logistics, and bills transactions. DLSS transactions are no more than 80 characters in length, which is symbolic of the days when 80 card column punch cards were manually loaded into computers for processing (Department of Defense 2012b; Columbia University 2014). DLSS transactions generally consist of the same data elements such as the type of transaction (e.g., requisition, modification, cancellation, follow-up, status update, receipt), the requesting organization, receiving organization, the document number, the shipping address, the billing address, the funding source, and dates of transactions recorded in Julian date format (Department of Defense 2012b). Each data

element is a code that translates to a specific meaning. Accordingly, an individual must refer to a manual or website in order to translate each data element into meaningful information. The limitation of data elements to 80 characters does not allow for lengthy information in a single transaction such as a detailed description of an item requested, detailed contact information, or special delivery instructions. Hence, DLSS is now considered a legacy DAAS profile that is gradually being replaced with DLMS transactions that communicate with the DoD eBusiness Gateway (EBUS) (Department of Defense 2012b).

Unlike DLSS, DLMS transactions are based upon the American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12 standards (Department of Defense 2012b). ANSI ASC X12 is a standardized method for businesses to communicate business transactions using Electronic Data Interchange (EDI) (Accredited Standards Committee 2014). Electronic Data Interchange (EDI) how businesses communicate business data in standardized formats (Accredited Standards Committee 2014). By migrating from DLSS to DLMS, standardized EDI transactions enable the military to enhance interoperability between the military services, the Department of Defense, the Defense Logistics Agency, multinational partners, industry, and various sources of supply. Moreover, DLMS provides the capability of securely communicating lengthy, detailed information in a single transaction. Thanks to Extensible Markup Language (XML) that works in conjunction with EDI, DLMS transactions can be quickly converted via Business-to-Business (B2B) integration software into an easily read format (Department of Defense 2012b; Accredited Standards Committee 2014; Oracle 2011). This alleviates the need to use manuals or websites to

interpret codes as previously done with DLSS transactions (Accredited Standards Committee 2014). It is expected that in the future, all of the military services and the Department of the Defense will use DLMS transactions (Department of Defense 2012b).

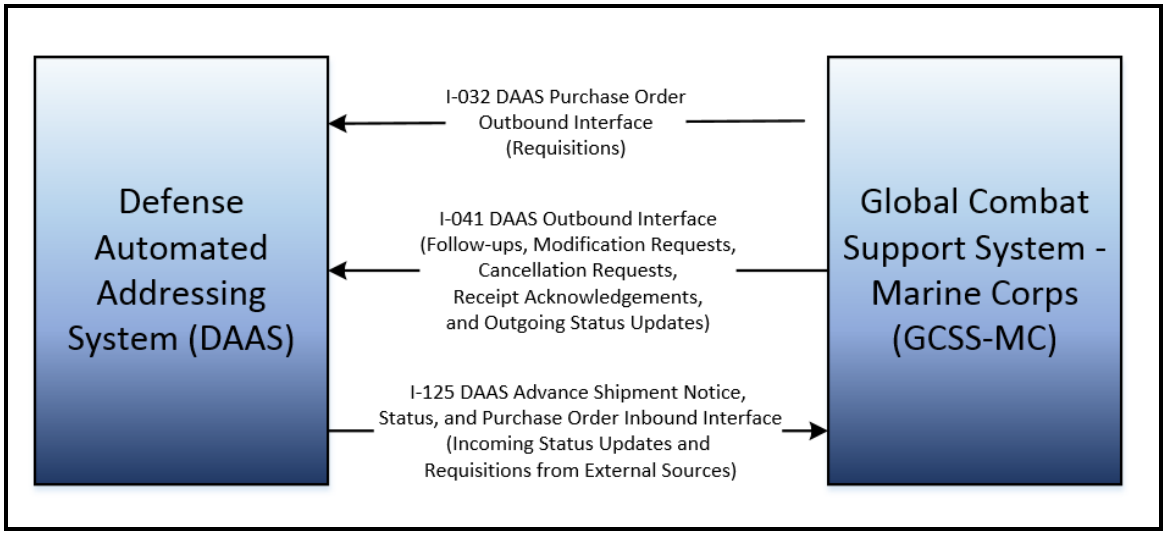

Figure 1. GCSS-MC and DAAS Interaction

Source: Created by author.
This diagram illustrates how GCSS-MC interacts with DAAS via three interfaces. This diagram assists in understanding how DAAS enables the Marine Corps to communicate with the Defense Logistics Agency, external suppliers, and the other services.

The Marine Corps has already implemented the use of DLMS EDI transactions in GCSS-MC (Department of the Navy 2009d; Department of the Navy, 2009f; Department of the Navy 2009g). Appendix C provides a comprehensive list of DLMS transactions including those implemented by the Marine Corps. As illustrated in figure 1, GCSS-MC currently has three interfaces with DAAS: (1) I-032 DAAS Purchase Order Outbound Interface; (2) I-041 DAAS Outbound Interface; and (3) I-125 DAAS Advanced Shipment

Notice (ASN), Status, and Purchase Order Inbound Interface (Department of the Navy 2009d; Department of the Navy 2009f; Department of the Navy 2009g). All requisitions originating from Marine Corps units in GCSS-MC are communicated to DAAS via I-032 (Department of the Navy 2009d). All follow-ups, modification requests, cancellation requests, receipt acknowledgements, and outgoing status updates are communicated to DAAS via I-041 (Department of the Navy 2009f). All inbound status updates and shipment notifications are communicated from DAAS to GCSS-MC via I-125 (Department of the Navy 2009g). I-125 was also designed to accept requisitions originating from military organizations outside of GCSS-MC (i.e., Navy, Army, Air Force, and Coast Guard) (Department of the Navy 2009g).

When GCSS-MC receives a requisition from another military service via I-125, GCSS-MC will internally create a sales order to fulfill the requisition (Department of the Navy 2009g).[7] In turn, as the sales order is processed through to completion within GCSS-MC, status updates are communicated back to DAAS via I-041 (Department of the Navy 2009f). Subsequently, DAAS routes status updates back to the requesting organization. Collectively, GCSS-MC's interfaces with DAAS enable the Marine Corps to achieve interoperability with the other services.

[7]In GCSS-MC, a sales order is a supporting unit's obligation to fulfill a supported unit's requisition (also referred to as a Purchase Order). The sales order corresponds to the supported unit requisition's Document Number and is used to track the requisition through to completion.

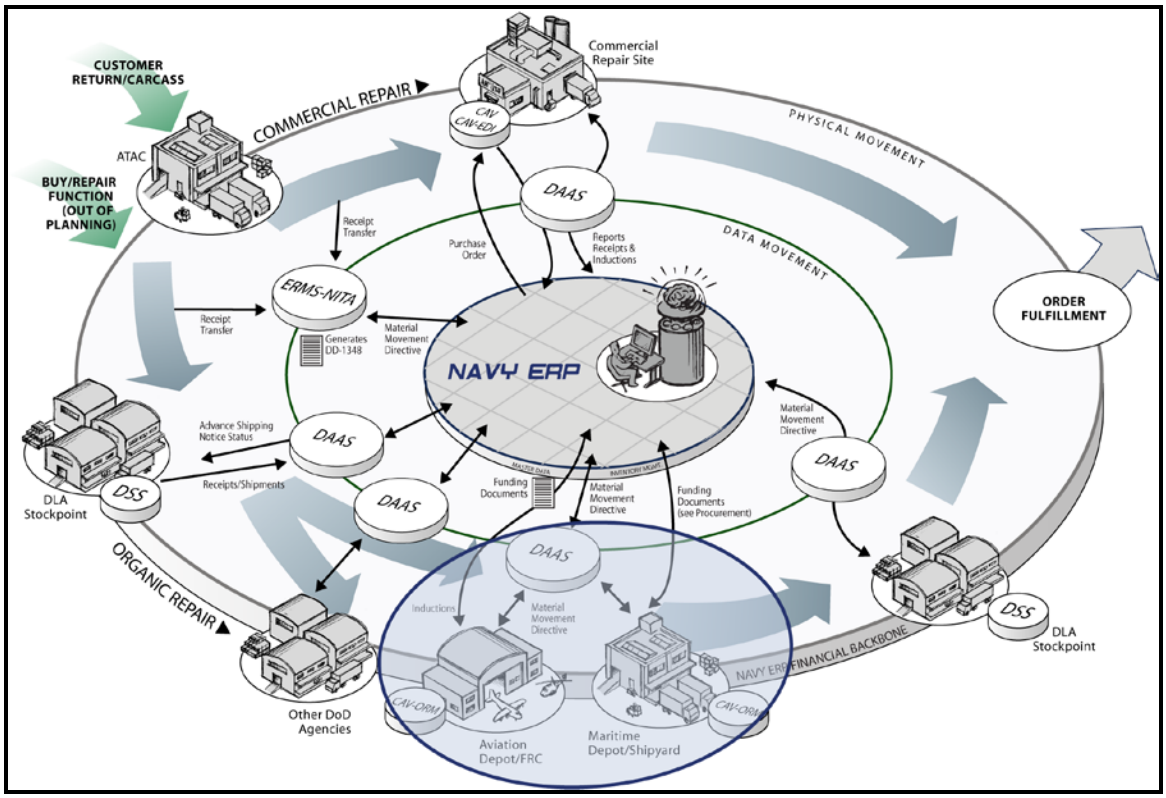

Figure 2. Navy ERP and DAAS Interaction.

Source: Department of the Navy, "Physical Inventory Operations - WM Introduction: Navy ERP Instructor-Led Training" (PowerPoint presentation, Program Executive Office, Enterprise Information Systems, 2013), http://www.erp.navy.mil/ (accessed 18 April 2014).
This diagram illustrates how DAAS enables Navy ERP to communicate with: Commercial Repair Sites; DLA Stockpoints; Aviation Depots and Fleet Readiness Centers; and Maritime Depots and Shipyards via DAAS.

The Navy has also implemented the use of DLMS transactions in Navy ERP (Department of the Navy 2013d). As illustrated in figure 2, Navy ERP uses DAAS to communicate transactions such as purchase orders, material movement directives, advance shipping notices, and funding documents (Department of the Navy 2013d). Navy ERP communicates with: Commercial Repair Sites; Defense Logistics Agency Stock

points; Aviation Depots and Fleet Readiness Centers; Maritime Depots and Shipyards; and other Department of Defense agencies via DAAS (Department of the Navy 2013d).

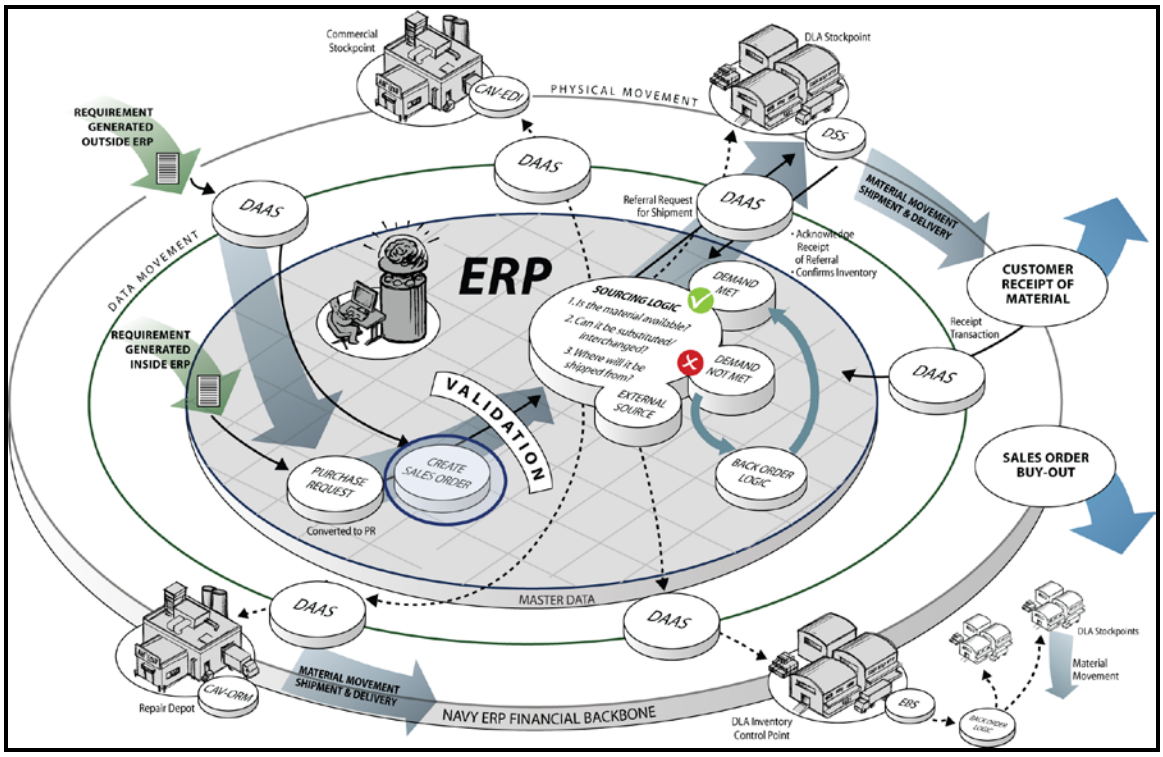

Figure 3. Navy ERP Customer Order Processing.

Source: Department of the Navy, "Customer Order Operations Introduction: Navy ERP Instructor-Led Training" (PowerPoint presentation, Program Executive Office, Enterprise Information Systems2013), http://www.erp.navy.mil/ (accessed 18 April 2014).
This diagram illustrates how DAAS enables Navy ERP to accept requirements from originating from customers outside of Navy ERP. This diagram assists in understanding how DAAS enables Navy ERP's to communicate the requirement to: Repair Depots, DLA Inventory Control Points, DLA Stockpoints, and Commercial Stockpoints via DAAS.

Figure 3 illustrates Navy ERP's processing logic for customer requirements originating internally and externally to Navy ERP (Department of the Navy 2013c). This

diagram also illustrates Navy ERP's interaction with Repair Depots, DLA Inventory Control Points, DLA Stock points, and Commercial Stock points via DAAS (Department of the Navy 2013c). In theory, according to Navy ERP's processing logic, if Navy ERP were to receive a requisition from the Marine Corps via DAAS, Navy ERP would internally create a sales order to fulfill the requisition (Department of the Navy 2013c). Subsequently, Navy ERP would undergo a validation of the requirement followed by sourcing from a DLA stock point, DLA Inventory Control Point, Commercial stock point, or Repair Depot. In sourcing the requirement, Navy ERP would use DAAS to communicate the requirement (Department of the Navy 2013c). Additionally, status updates are communicated to the requesting organization via DAAS (Department of the Navy 2013c). Navy ERP would also communicate a billing transaction to the requesting organization to affect payment (Department of the Navy 2013c). Lastly, once the order is fulfilled, Navy ERP would receive a receipt acknowledgement from the requesting organization (Department of the Navy 2013c).

Interfaces and Web services

Besides DAAS, interfaces and web-services may also facilitate interoperability between the military services, the Department of Defense, the Defense Logistics Agency, and various sources of supply.

> An interface is a boundary across which two independent systems meet and act on or communicate with each other. In computer technology, there are several types of interfaces: (1) user interface - the keyboard, mouse, menus of a computer system allows the user to communicate with the operating system;
> (2) software interface - the languages and codes that the applications use to communicate with each other and with the hardware; and (3) hardware interface - the wires, plugs and sockets that hardware devices use to communicate with each other. (Webopedia, 2014a)

GCSS-MC and Navy ERP both have several interfaces that enable them to communicate with other systems such as DAAS (Government Accountability Office 2012). GCSS-MC has approximately 37 interfaces to several different systems (Government Accountability Office 2012). Navy ERP has approximately 48 interfaces to several different systems (Government Accountability Office 2012). Collectively, these interfaces facilitate interoperability between multiple systems and may also facilitate interoperability between GCSS-MC and Navy ERP.

> Used primarily as a means for businesses to communicate with each other and with clients, Web services allow organizations to communicate data without intimate knowledge of each other's IT systems behind the firewall. Web services allow different applications from different sources to communicate with each other without time-consuming custom coding. (Webopedia 2014b)

Presently, GCSS-MC has four outbound web services to four different systems that provide various management reports (Department of the Navy 2009h; Department of the Navy 2009i; Department of the Navy 2009j; Department of the Navy 2009k). For instance, GCSS-MC has an outbound web-service that transmits the Marine Corps' retail inventories and equipment totals to IGC's AV (Department of the Navy 2009i). In turn, AV assimilates this information with the other military services' retail inventories, wholesale inventories, and equipment totals in order to create total asset visibility reports. AV reports aid in the timely location of available items throughout DOD. This is invaluable especially in terms of locating items that are subject to Diminishing Manufacturing Sources and Material Shortages (DMSMS). Thus, web services are a way that the Navy and Marine Corps can share information and facilitate interoperability. Sharing information and using interoperable supply systems are enablers to supply chain management.

Supply Chain Management

Supply chain management is "the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole" (Martin 2005, 5). Common relationships within a supply chain involve retailers, wholesalers, manufacturers, distributors, and suppliers. All actors within a supply chain exist to support an upstream and/or downstream supply chain partner. The basic principles of supply chain management are: (1) sharing information to synchronize actions; (2) reengineering business processes to maximize efficiency; (3) decreasing procurement lead times by maintaining partnerships with suppliers; (4) reducing complexity (e.g., streamlining cumbersome processes and eliminating multiple variants of the same item); (5) postponing the final assembly of raw materials into a final product until the item is requested; (6) managing processes instead of individual tasks or departments; (7) and using suitable metrics to assess performance (Martin 2005).

NLI is largely about improving the Department of the Navy's supply chain management (Department of the Navy 2011b; Secretary of the Navy 2011; United States Marine Corps 2010). The Navy and Marine Corps use the NLI Senior Board as a forum to share information such as best practices and the capabilities of various logistical systems. The NLI Senior Board also synchronizes NLI initiatives and uses the NLI Playbook to share information throughout the Department of the Navy (Department of the Navy 2009l; United States Marine Corps 2013b). The NLI Playbook contains a notional predeployment planning timelines that is especially useful for synchronizing

supply chain actions between the Navy and Marine Corps to maximize efficiency and effectiveness during deployments.

Besides the NLI Playbook, systems such as IGC's AV, GCSS-MC, and Navy ERP are enablers to sharing information and synchronizing activities throughout the supply chain. IGC's AV facilitates the sharing of information such as the locations of available retail and wholesale inventories. GCSS-MC and Navy ERP provide information to AV so that it can be shared with supply chain partners (Department of the Navy 2009i). The information shares is necessary to facilitate timely sourcing decisions.

NLI is also about streamlining processes, maximizing efficiency, and reducing supply chain response times (Department of the Navy 2010c; United States Marine Corps 2010).[8] Specific business areas include, but are not limited to: purchasing, inventory management, order management, logistics, distribution, and customer service. Streamlining these processes contributes to a flexible and responsive supply chain, which is essential to projecting and sustaining combat power.

Partnership is another key aspect of NLI and contributes to synchronization of supply chain activities (Department of the Navy 2001b; Martin 2005; Secretary of the Navy 2011; United States Marine Corps 2010). Through partnerships, the Navy and the Marine Corps can share information, provide mutual support, streamline processes, and provide superior combat service support. Interoperable ground supply systems are enablers to partnership as it allows for the efficient communication of supply transactions

[8]"Supply chain response time is the total average length (measured in days) of the supply chain. This metric is derived from the average plan, source, maintain (repair), and deliver cycle times. Generally, the shortest supply chains are the most responsive chains" (Logistics Management Institute 1999).

such as requisitions, status update requests, cancellation requests, modification requests, status updates, and shipment notifications.

NLI is also about measuring supply chain performance via relevant metrics (Department of the Navy 2011b). Besides measuring performance, metrics are essential for identifying problematic areas for process improvement. Some metrics that are particularly useful for the Navy and the Marine Corps to assess supply chain performance are: (1) Perfect Order Fulfillment;[9] (2) Supply Chain Response Time; (3) Supply Chain Management Costs as a Percent of Sales;[10] (4) Inventory Turns;[11] and (5) Weapon System Not Mission-Capable (NMC) Rates[12] (Logistics Management Institute 1999). Navy ERP and GCSS-MC enable the Navy and Marine Corps to record supply chain actions and quantitatively measure supply chain performance.

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[9]"A perfect order is an order that is: (1) Delivered complete; all items delivered in the quantities requested; (2) Delivered on time; using the customer's definition of delivery; (3) Complete and accurate documentation (including packing slips, bills of lading, and invoices) to support the order; and (4) Delivered in perfect condition and in the right configuration, faultlessly installed (as applicable)" (Logistics Management Institute 1999).

[10]Supply Chain Management Costs as a Percent of Sales is "a metric that measures all costs for operating a supply chain as a percent of the value of materiel moving through it. Supply chain management costs are the management information system, finance and planning, inventory carrying, materiel acquisition, and order management costs" (Logistics Management Institute 1999).

[11]Inventory Turnover "is a metric (the total sales at acquisition price divided by the value of inventory at acquisition price) that measures how effectively assets are managed" (Logistics Management Institute 1999).

[12]Weapon System Not Mission-Capable (NMC) Rates "is a metric that represents the percent of time a weapon system fleet is not mission-capable because of supply (lack of parts), maintenance (lack of maintenance resources), or both. NMC rates should be prepared for key weapon systems and used with other metrics (e.g., perfect order fulfillment and supply chain response time) that can be filtered by weapon system" (Logistics Management Institute 1999).

Summary

This chapter provided a comprehensive literature review that describes interoperability and how it relates to NLI, GCSS-MC, Navy ERP, and DAAS. The subject of Operational Availability demonstrates how interoperable supply systems may lead to increased readiness. Improving interoperability, inter-service support, and readiness are reasons why NLI is an important strategic initiative for the Navy and the Marine Corps. NLI may be facilitated by DAAS, interfaces, and web services, which are key enablers to interoperability between the Navy and Marine Corps ground supply systems. Sharing information and using interoperable systems are enablers to supply chain management.

Conclusion

Based upon the literature reviewed, a method for addressing the research questions is developed in chapter 3. In chapter 4, the method is tested and the results are analyzed. Based upon analysis of the test results, recommendations on how to increase the interoperability between the Navy and Marine Corps ground supply systems are provided in chapter 5. Collectively, this research contributes to the body of knowledge by: (1) establishing a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP and (2) providing recommendations on how interoperability can be increased between GCSS-MC, Navy ERP, and other Joint supply systems. The goal is to bring about changes to systems, doctrine, and policy resulting in interoperable supply systems throughout the Department of Defense.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable ground supply systems. The research questions are addressed by using a problem-solving approach based off of the Joint Operational Planning Process (JOPP); an accepted doctrinal approach for achieving a desired end state (Joint Chiefs of Staff 2011). This problem-solving approach defines current conditions, a desired future state, and a method to progress systematically from the current conditions to the desired future state. Within the problem-solving approach, lines of effort represent the method for progressing from the current conditions to the desired future state. Lines of effort contain specific objectives that, once satisfied, facilitate desired conditions. Collectively, desired conditions contribute to the attainment of the desired future state. This research uses models to test specific objectives within a problem-solving approach to generate a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. The test results are used to provide recommendations on how interoperability can be increased between GCSS-MC, Navy ERP, and other Joint supply systems.

Problem-Solving Approach

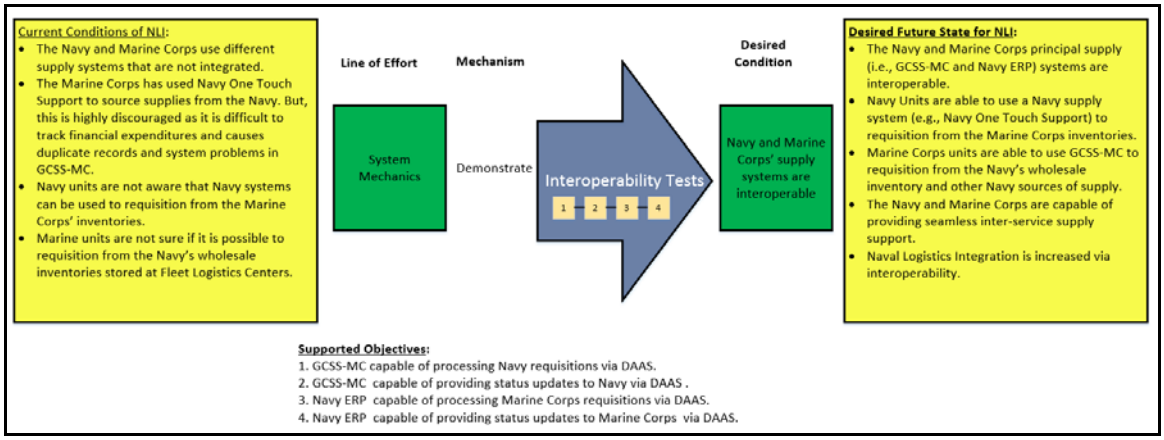

Figure 4. Problem-Solving Approach

Source: Created by author.
This problem solving approach describes how interoperability tests between the Navy and Marine Corps ground supply systems could lead to increased Naval Logistics Integration. A larger, more readable copy of this problem-sovling approach is available in Appendix D.

The problem-solving approach in figure 4 provides a general description of the current state of NLI with the particular emphasis on key ground supply systems used by the Navy and the Marine Corps (i.e., Navy ERP, GCSS-MC, and Navy One Touch Support). In order to describe current conditions of NLI, Navy ERP and GCSS-MC program documentation were analyzed to extrapolate the key capabilities of each system and understand how interoperability may be achieved (Department of the Navy 2009c; Department of the Navy 2009d; Department of the Navy 2009g; Department of the Navy 2013a; Department of the Navy 2013b; Department of the Navy 2013c; Department of the Navy 2013d; Department of the Navy 2013f). The Marine Forces Playbook explains

how the Marine Corps currently obtains supply support from the Navy (United States Marine Corps 2013b).

The desired future state in figure 4 was defined using Headquarters Marine Corps' (HQMC) Expeditionary Logistics War game Plan titled "Naval/Joint/Coalition Logistics Interoperability" (Kirk 2014). In June 2014, HQMC will conduct an exercise titled the "Expeditionary Logistics War game." The purpose of the Expeditionary Logistics War game is to find ways to improve Logistics Chain Management (LCM), logistics command and control, and operational challenges through the application of current and emerging Information Technology (IT) solutions (Kirk 2014).

Naval/Joint/Coalition Logistics Interoperability is one of six stated objectives within the Expeditionary Logistics War game Plan. The purpose of the Naval/Joint/Coalition Logistics Interoperability objective is to improve interoperability between logistics systems to enable inter-service support between the Navy, Marine Corps, Joint, and Coalition partners (Kirk 2014). The results of the Expeditionary Logistics War game will be used to inform the Navy, Marine Corps, and Secretary of Defense on a viable approach for increasing interoperability between systems (Kirk 2014). Thus, the desired future state on problem-solving approach in figure 4 is designed to help facilitate the fulfillment of HQMC's Naval/Joint/Coalition Logistics Interoperability objective.

To describe how to progress from the current conditions to the desired future state, a system mechanics line of effort was established. The purpose of system mechanics line of effort is to describe what system functionality requirements are necessary for the Navy and Marine Corps ground supply systems (i.e., GCSS-MC and

Navy ERP) to achieve interoperability. Simply put, this line of effort answers the question, “Do the system mechanics support interoperability?” The system mechanics line of effort contains supported objectives that, once achieved, indicate progress towards achieving the desired conditions and the desired future state. For example, the system mechanics line of effort has a supported objective called “GCSS-MC capable of processing Navy requisitions via DAAS.” This indicates a point in time where the Navy is capable of sending requisitions to GCSS-MC via DAAS for subsequent processing. This research tests the supported objectives to generate a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. The results of this test are used to develop recommendations on how interoperability can be increased between GCSS-MC, Navy ERP, and other Joint supply systems.

Web-SALTS/Navy One Touch Support and GCSS-MC Interoperability Model

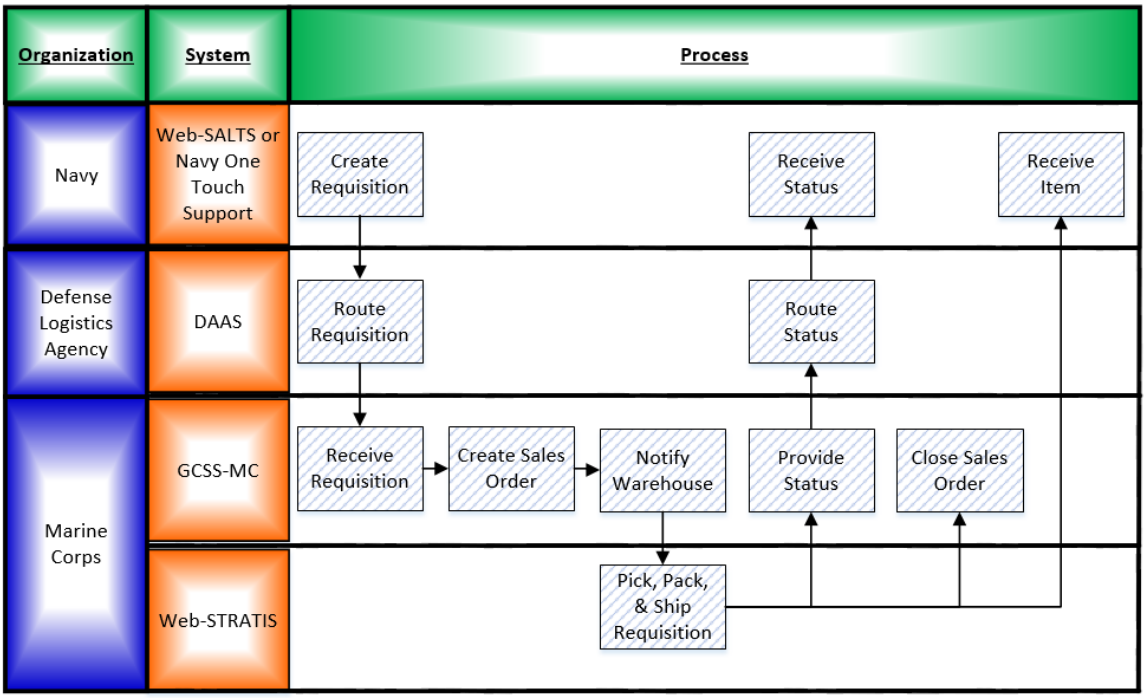

Figure 5. Web-SALTS/Navy One Touch Support and GCSS-MC Interoperability Model

Source: Created by author.

In this model, DAAS is the mechanism that facilitates interoperability between the Navy and the Marine Corps. This model depicts how the Navy can use DAAS to route a requisition from Web-SALTS or Navy One Touch Support to GCSS-MC for subsequent fulfillment by the Marine Corps. Payment for items issued is a manual process; therefore, payment is purposefully not depicted in this model.

To test the first and second supported objectives in figure 4, the model in figure 5 was designed to depict how a Navy unit (using Web-SALTS or Navy OTS) could potentially use DAAS to send a requisition to a Marine Corps unit (using GCSS-MC) for subsequent fulfillment. This model also depicts how the Marine Corps unit could use DAAS to provide status updates back to the Navy unit that originated the request. In this

model, DAAS is the mechanism that facilitates interoperability between the Navy and the Marine Corps.

Figure 5 is necessary to understand how Web-SALTS or Navy OTS and GCSS-MC communicate with each other through DAAS. This model was developed based upon the assumption that GCSS-MC is capable of processing requisitions received from external organizations via DAAS. It is also assumed that GCSS-MC can provide subsequent supply status transactions back to the external requesting unit via DAAS. The basis for these assumptions is two-fold. First, according to GCSS-MC program documentation, GCSS-MC was designed to accept and subsequently process requisitions from external organizations (i.e., Navy, Army, Air Force, Coast Guard) (Department of the Navy 2009f; Department of the Navy 2009g). Second, GCSS-MC's DAAS logic is governed by the Defense Logistics Management Standards (DLMS), which stipulates how the services can communicate transactions with external suppliers and supply chain partners via DAAS (Department of the Navy 2009d; Department of the Navy 2009f; Department of the Navy 2009g).

The model in figure 5 is validated using the results of previous interoperability tests. Analysis of the test results are used to describe how DAAS can facilitate interoperability between the Navy and the Marine Corps. The interoperability test findings are summarized in chapter 4 and recommendations are provided in chapter 5.

GCSS-MC and Navy ERP Interoperability Model

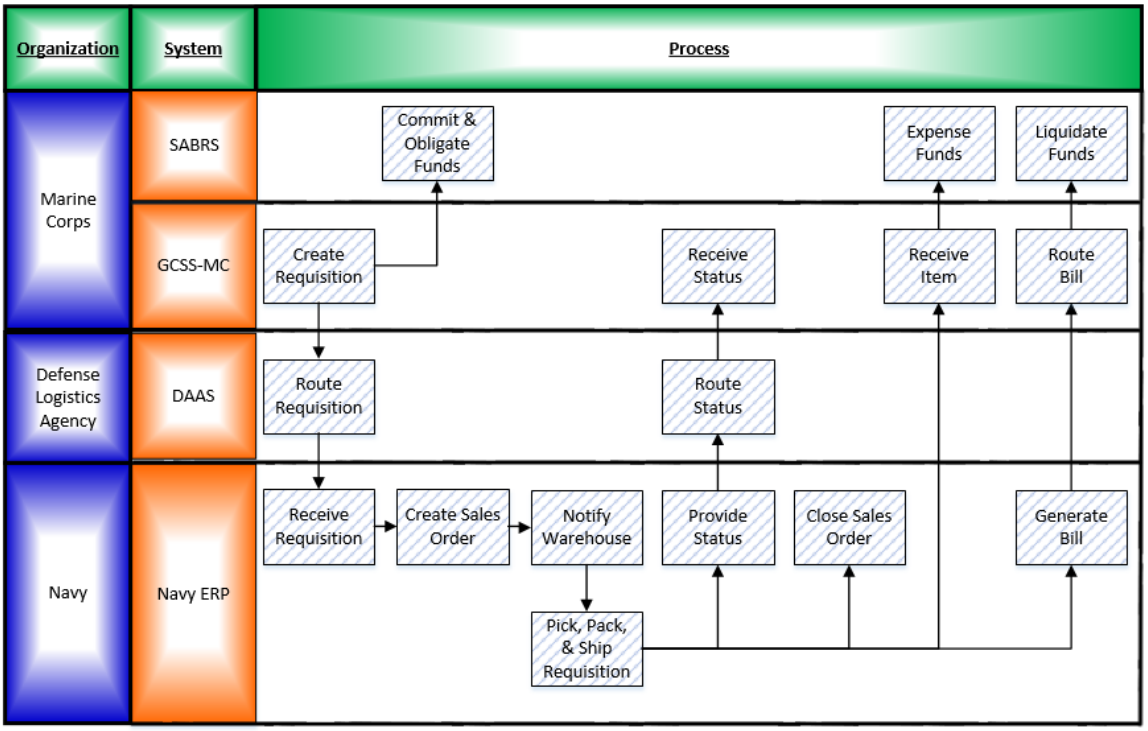

Figure 6. GCSS-MC and Navy ERP Interoperability Model

Source: Created by author.

In this model, DAAS is the mechanism that facilitates interoperability between the Navy and the Marine Corps. This model depicts how the Marine Corps can use DAAS to route a requisition from GCSS-MC to Navy ERP for subsequent fulfillment by the Navy. This model also portrays how the Navy can use DAAS to route a bill from Navy ERP to the Marine Corps' financial system Standard Accounting Budgeting Reporting System (SABRS) for payment.

To test the third and fourth supported objectives in figure 4, the model in figure 6 portrays how a Marine Corps unit (using GCSS-MC) could potentially use DAAS to send a requisition to the Naval Supply Systems Command (NAVSUP) (Navy ERP) for subsequent fulfillment by a Fleet Logistics Center (FLC). This model also depicts how NAVSUP unit could potentially use DAAS to provide status updates back to the Marine

Corps unit that originated the request. In this model, DAAS is the mechanism that facilitates interoperability between the Navy and the Marine Corps.

The model in figure 6 is necessary to understand how Navy ERP and GCSS-MC can potentially communicate with each other using DAAS. This model was developed based upon the assumption that Navy ERP is capable of processing requisitions received from external organizations via DAAS (Department of the Navy 2013a; Department of the Navy 2013c; Department of the Navy 2013d; Department of the Navy 2013f). It is also assumed that Navy ERP can provide subsequent supply status transactions back to the external requesting unit via DAAS. The basis for these assumptions is two-fold. First, according to Navy ERP's training documentation (see figure 3 in chapter 2), Navy ERP was designed to accept and subsequently process requisitions from external organizations (i.e., Marine Corps, Army, Air Force, Coast Guard). Second, Navy ERP's DAAS logic is governed by the Defense Logistics Management Standards (DLMS), which stipulates how the services can communicate transactions with external suppliers and supply chain partners via DAAS.

The model in figure 6 is validated by conducting an interoperability test between GCSS-MC and Navy ERP. Specifically, a Marine Corps unit uses GCSS-MC to create a requisition for automatic routing to NAVSUP (uses Navy ERP) via DAAS. The test results confirm whether or not a Marine Corps unit (using GCSS-MC) can requisition items from the NAVSUP via DAAS. The test results also confirm whether or not GCSS-MC and Navy ERP are interoperable. Analysis of the test results are used to describe how DAAS can be used to facilitate interoperability between the Navy and the Marine Corps.

The interoperability test findings are summarized in chapter 4 and recommendations are provided in chapter 5.

Summary

This chapter described how the research questions will be answered using a problem-solving approach. The problem-solving approach defined current conditions of NLI, a desired future state for NLI, and a method to progress systematically from the current conditions to the desired future state. Within the problem-solving approach, a line of effort called "system mechanics" was developed. The system mechanics line of effort is used to describe the method for progressing from the current conditions to the desired future state. The system mechanics line of effort contains specific objectives that, once satisfied, facilitate desired conditions. Collectively, desired conditions contribute to the attainment of the desired future state. Interoperability models were developed and presented.

Conclusion

In chapter 4, interoperability models are used to test specific objectives within a problem-solving approach. The test results are used in chapter 4 to generate a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. The test results are also used in chapters 4 and 5 to provide recommendations on how interoperability can be increased between GCSS-MC, Navy ERP, and other Joint supply systems. The goal is to bring about changes to systems, doctrine, and policy resulting in interoperable supply systems throughout the Department of Defense.

CHAPTER 4

ANALYSIS AND FINDINGS

Introduction

This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable ground supply systems. A problem-solving approach is used (see chapter 3, figure 4) to answer the primary research question. The problem-solving approach defines the current conditions of NLI, a desired future state, and a method for progressing systematically from the current conditions to the desired future state. A system mechanics line of effort is established within the problem-solving approach. The system mechanics line of effort represents methods for progressing from the current conditions to the desired future state. The system mechanics line of effort contains specific objectives that, once satisfied, facilitate desired conditions. Collectively, desired conditions contribute to the attainment of the desired future state. Models are developed and used to test specific objectives within the problem-solving approach to generate a baseline estimate of the amount of interoperability that exists between GCSS-MC and Navy ERP. Interoperability tests between: (1) Web-SALTS, Navy One Touch Support (OTS), Global Combat Support System-Marine Corps (GCSS-MC), and the Defense Automated Addressing System (DAAS) and (2) GCSS-MC, Navy Enterprise Resource Planning (ERP), and DAAS validate the models. Documentation and analysis of the test results contribute to recommendations on how to increase interoperability between GCSS-MC, Navy ERP, and other Joint supply systems.

GCSS-MC, Web-SALTS, Navy OTS, and DAAS Interoperability Test

Overview

On July 14, 2011, Mr. Eric Gray, from Headquarters Marine Corps (HQMC) Installations and Logistics (I&L), designed and coordinated interoperability tests between the Naval Mobile Construction Battalion (NMCB) (also referred to as Navy Seabees) and the Supply Management Unit (SMU). The Navy Seabees are located at Camp Shields in Okinawa, Japan. The SMU is located at Camp Kinser in Okinawa, Japan. The systems involved in the test were Web-SALTS, Navy OTS, GCSS-MC, Web-STRATIS, and DAAS. At the time of the tests, the author was the SMU Officer-in-charge (OIC). Accordingly, the author helped Mr. Gray and the Navy Seabees conduct the interoperability tests.

The purpose of these tests was to validate the Web-SALTS/Navy OTS, and GCSS-MC Interoperability Model (see chapter 3, figure 5) and the first two supported objectives on the system mechanics line of effort (see chapter 3, figure 4). In conducting this test, there were two expected outcomes. The first expected outcome was that the Navy Seabees could use Web-SALTS or Navy OTS to send a requisition to GCSS-MC via DAAS for subsequent processing. The second expected outcome was that GCSS-MC was capable of sending status updates back to Web-SALTS or Navy OTS via DAAS. Verification of these two outcomes would provide evidence that: (1) Web-SALTS and GCSS-MC are interoperable via DAAS; (2) Navy OTS and GCSS-MC are interoperable via DAAS; (3) A Marine Corps unit using GCSS-MC can support a Navy unit using Web-SALTS or Navy OTS or a similar system; (4) GCSS-MC is capable of supporting

other Joint organizations via DAAS; and (5) DAAS can be used to increase the interoperability between the Navy, Marine Corps, and other services' supply systems.

Preliminary Steps and Initial Findings

There were some essential preliminary actions that were required before the tests were successfully conducted. First, before GCSS-MC could accept a requisition from the Navy Seabees, the GCSS-MC Helpdesk had to manually establish the Navy Seabees' Department of Defense Activity Address code (DODAAC) as a customer within GCSS-MC. Initially, this setup was not done. Consequently, the first few transactions that GCSS-MC received from DAAS containing the Navy Seabees' DODAAC were immediately rejected and treated as an error. Second, the Web-STRATIS Field Service Representative (FSR) had to establish the Navy Seabees' DODAAC as a customer within Web-STRATIS. Originally, this setup was also not completed. Therefore, the first few transactions that Web-STRATIS received from GCSS-MC were immediately rejected and treated as an error. Lastly, the SMU had to add the Navy Seabees' DODAAC to the Marine Air Ground Task Force (MAGTF) Material Distribution Center's (MMDC)[13] delivery matrix, so that the MMDC would know where to deliver requested items. Initially, this was not done. As a result, the first few shipments were delayed until the proper recipient and appropriate shipment method could be identified.

[13]The MMDC is a shipping and receiving organization that handles inbound and outbound shipments for the SMU and other Marine Corps units.

Findings

Once the preliminary steps were accomplished, the Navy Seabees successfully created requisitions using Web-SALTS that were routed to GCSS-MC via DAAS. In creating the requisitions, the Navy Seabees manually specified the SMU's Routing Identification Code (RIC) of "MR1" so that DAAS would automatically know where to route the transaction.[14] GCSS-MC received the requisitions from its DAAS inbound interface. Records of the requisitions were recorded in GCSS-MC's Document History.[15] Subsequently, sales orders were created that corresponded to each requisition's Document Number.

Initially, when the sales orders were created, a problem was discovered in GCSS-MC's sales order generation logic. Specifically, GCSS-MC failed to populate the sales orders with the sub inventory value of "01A." This would indicate that the requisitions were for serviceable items from the serviceable sub inventory.[16] Consequently, whenever

[14]The SMU's RIC of "MR1" is associated to the SMU's DODAAC of "MMR100." The SMU's RIC and DODAAC are associated to the Data Pattern Communication Routing Identifier (COMMRI) of "RUSAHUO." The Data Pattern COMMRI "RUSAHUO" translates to GCSS-MC. The Data Pattern COMMRI ensures that all transactions (excluding bills) are sent from DAAS to GCSS-MC. The SMU's RIC, DODAAC, and Data Pattern COMMRI are all registered in DAAS.

[15]Document History is a table in GCSS-MC were all supply transactions are recorded. Examples of transactions stored in Document History are requisitions, modification requests, cancellation requests, status follow-up requests, status updates, shipment notifications, and receipts. GCSS-MC users are able to view and/or manage transactions stored in Document History via the Document Management form. The Document Management form enables GCSS-MC users to communicate with suppliers both internal and external to GCSS-MC. Communication with suppliers external to GCSS is accomplished via DAAS.

[16]In GCSS-MC, for each organization, inventory is segmented into two sub inventories: serviceable and unserviceable. Serviceable inventory is stored in the sub inventory 01A. Unserviceable inventory is stored in the sub inventory 01F.

pick release ran, GCSS-MC did not know which sub inventory the items needed to be pulled from (i.e., serviceable or unserviceable).[17] Thus, the sales orders were essentially stuck and could not be processed until the GCSS-MC Helpdesk manually entered the sub inventory value of "01A" for each sales order. Once corrected, pick release ran successfully and the sales orders were released to the warehouse (within GCSS-MC only) for subsequent processing.

After pick release ran, GCSS-MC sent Web-STRATIS a Material Release Orders (MRO) (also referred to as a pick) via the Web-STRATIS outbound interface.[18] Upon receipt of the MROs, warehouse personnel were able to view the requests in Web-STRATIS and obtain specified inventory locations where the items could be located in the warehouse. Once warehouse personnel retrieved the items, Web-STRATIS sent GCSS-MC pick confirmations via the Web-STRATIS inbound interface.[19]

Upon receipt of the pick confirmations from Web-STRATIS, GCSS-MC conducted transact move orders (i.e., a pick within GCSS-MC). Simultaneously, status updates were generated and sent back to the Navy via the DAAS outbound interface and

[17]Pick release is an program that releases a new sales order to the warehouse for subsequent fulfillment. Pick release can be executed manually or scheduled to run automatically.

[18]The Web-STRATIS outbound interface is a regularly scheduled concurrent program that sends new MROs to Web-STRATIS based upon sales orders that have been released to the warehouse in GCSS-MC.

[19]The Web-STRATIS inbound interface is a regularly scheduled concurrent program that sends all receipts, issues, transfers, and inventory adjustments to GCSS-MC. This ensures that the inventory balances match between GCSS-MC and Web-STRATIS.

subsequently DAAS. Records of the pick confirmation were recorded in GCSS-MC's Document History.

Once the items were shipped, Web-STRATIS sent GCSS-MC shipment confirmations via the Web-STRATIS inbound interface. Upon receipt of the shipment confirmations from Web-STRATIS, GCSS-MC conducted shipment confirmations that closed the sales orders. Simultaneously, status updates were generated and sent back to the Navy via the DAAS outbound interface and subsequently DAAS. Records of the shipment transactions were recorded in GCSS-MC's Document History.

With regards to payment for items issued from inventory, the SMU does not have the authority or capability to generate bills to send to the Navy via DAAS for subsequent liquidation. Accordingly, payment for the items issued to the Navy Seabees was accomplished manually via a Navy Comptroller (NAVCOMPT) Form 2275, "Order for Work and Services." Essentially, this form enables the Navy to provide an advance amount of money to the Marine Corps Comptroller to cover the costs of items issued from inventory. When the Navy creates requisitions, funds are committed and obligated in the Navy's financial system of record. This enables the Navy to control spending and ensure that the Navy does not overspend its budget. Similarly, at least weekly, the SMU reviews its records for items issued to the Navy. This ensures that the Comptroller is cognizant of the Navy's available balance according to the total cost of the items issued from the SMU to the Navy.

To supplement the documented findings, screenshots from this interoperability test are available in Appendix E.

GCSS-MC, Navy ERP, and DAAS Interoperability Test

Overview

On February 21, 2014, the author designed and conducted an interoperability test between specific Navy and Marine Corps ground supply systems. The test involved two organizations: (1) the Naval Supply Systems Command (NAVSUP) and (2) the Supply Management Unit (SMU). NAVSUP is located at Mechanicsville, Pennsylvania. The SMU is located at Camp Kinser in Okinawa, Japan. The systems involved in the test were the GCSS-MC, Navy ERP, and DAAS. NAVSUP is listed as a participant; however, NAVSUP was not aware that the test was being conducted. NAVSUP is mentioned because transactions were sent to NAVSUP without NAVSUP's prior knowledge. Thus, NAVSUP was an indirect participant in the study.

In conducting this test, there were two expected outcomes. The first expected outcome was that the SMU could use GCSS-MC to send a requisition to Navy ERP via DAAS for subsequent processing. The second expected outcome was that Navy ERP was capable of sending status updates back to GCSS-MC via DAAS. Verification of these two outcomes would provide evidence that: (1) Navy ERP and GCSS-MC are interoperable via DAAS; (2) NAVSUP using Navy ERP can support Marine Corps units using GCSS-MC; (3) Navy ERP is capable of supporting other Joint organizations via DAAS; and (4). DAAS can be used to increase the interoperability between the Navy, Marine Corps, and other services' supply systems.

Preliminary Steps

There were essential preliminary actions that were required before the test was conducted. First, suitable test items were identified. Suitable test items were: (1) common

items used by both the Navy and Marine Corps; (2) items managed by NAVSUP's Weapon Systems Support (WSS); and (3) items available-for-issue at a Fleet Logistics Center (FLC).[20] IGC's Asset Visibility (AV) tool was used to research NAVSUP WSS's wholesale inventory for items available-for-issue at an FLC. Research revealed over 100,000 inventory items managed by NAVSUP WSS and stored at various FLCs. A total of nine items were selected for the test. The rationale in selecting nine items from different FLCs was to see if it were possible have a requisition routed from NAVSUP WSS to a specific FLC for fulfillment. For the most part, each item selected was: (1) stored at a different FLC (i.e., different geographic location) and (2) only stored at only a single FLC.

The second step was to modify the SMU's sourcing rules within GCSS-MC, so that requisitions for the test items were directed towards NAVSUP WSS's RIC of 'NRP' instead of the normal routing to DLA's RIC of 'SMS'.[21] Since the SMU did not have

[20]NAVSUP Weapon System Support (WSS) is a centralized Inventory Control Point (ICP) for Navy owned and managed wholesale inventory. NAVSUP WSS uses Navy ERP to plan and procure inventory for physical storage at Fleet Logistics Centers (FLC) located at seven different geographic locations: (1) Jacksonville, Florida; (2) Norfolk, Virginia; (3) Pearl Harbor, Hawaii; (4) Puget Sound, Washington; (5) San Diego, California; (6) Sigonella, Italy; and (7) Yokosuka, Japan. At each FLC, the Defense Logistics Agency (DLA) uses the Distribution Standard System (DSS) to manage warehouse operations for the Navy's wholesale inventory. Unlike NAVSUP WSS who has a Navy DODAAC and RIC, each FLC storage location has a DLA DODAAC and RIC. Accordingly, DAAS is used to route transactions between the NAVSUP WSS and FLCs.

[21]Sourcing rules are used to define how an organization replenishes items (i.e., the default supplier). Within GCSS-MC, sourcing rules can be hierarchically defined in one of six ways: (1) An item across all organizations; (2) A single item in an inventory organization; (3) All items in an inventory organization; (4) Categories of items; (5) Categories of items in an inventory organization; or (6) All organizations (Oracle 2004, 543).

access to modify the sourcing rules in GCSS-MC, the SMU initiated a GCSS-MC trouble ticket so that the GCSS-MC Helpdesk could perform the necessary setups. Once the sourcing rules for the test items were setup in GCSS-MC, the SMU initiated the test using a template (provided by the author) that included the test items and the requisite data elements for data entry into GCSS-MC.

Findings

As expected, the modified sourcing rules for test items were immediately evident when the SMU began creating the test requisitions in GCSS-MC. All nine test requisitions were created without issue and were subsequently transmitted to DAAS via the DAAS Outbound Interface with the specified RIC of 'NRP' (i.e., NAVSUP WSS) instead of 'SMS' (i.e., DLA). However, once DAAS received the requisitions, DLA Transactions Services automatically modified the transactions and rerouted each requisition to DLA's RIC of 'SMS' instead of NAVSUP's RIC of 'NRP'. Subsequently, each requisition was routed to a DLA Distribution Point for fulfillment.

Table 1. Intended versus Actual Supplier and Storage Location for GCSS-MC, Navy ERP, and DAAS Interoperability Test

Test #	Supplier (Intended)	Supplier (Actual)	Storage Location (Intended)	Storage Location (Actual)
1	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST YOKOSUKA, JP	DLA DIST YOKOSUKA, JP
2	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST YOKOSUKA, JP SASEBO	DLA DIST YOKOSUKA, JP
3	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST PEARL HARBOR, HI	DLA DIST TRACY, CA
4	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST GUAM MARIANAS	DLA DIST TRACY, CA
5	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST WARNER ROBINS, GA	DLA DIST TRACY, CA
6	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST NORFOLK, VA	DLA DIST TRACY, CA
7	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST JACKSONVILLE, FL	DLA DIST OKINAWA, JP
8	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST SAN DIEGO, CA	DLA DIST YOKOSUKA, JP
9	NAVSUP (RIC-NRP)	DLA (RIC-SMS)	DLA DIST PUGET SOUND, WA	DLA DIST YOKOSUKA, JP

Source: Created by author.
This table shows the intended versus actual supplier that received the test requisitions from DAAS. This table also shows the expected versus the actual storage locations that fulfilled the test requisitions.

Table 1 shows the intended versus actual supplier that received the test requisitions from DAAS. Table 1 also shows the expected versus the actual storage locations that fulfilled the test requisitions. As indicated in the table 1, four requisitions were fulfilled by the DLA Distribution Center in Yokosuka, Japan, four requisitions were fulfilled by the DLA Distribution Center in Tracy, CA, and one requisition was fulfilled by DLA Distribution Center in Okinawa. It may appear that the first two requisitions were routed, as intended, to the DLA Distribution Center in Yokosuka. However, NAVSUP did not route the test requisitions to the DLA Distribution Center in Yokosuka as hoped for – DLA did. This means that the test requisitions were fulfilled from DLA's wholesale inventory instead of NAVSUP's.

To supplement the documented findings, screenshots from this interoperability test are available in Appendix F.

Summary

In this chapter, two interoperability models (see chapter 3, figures 4 and 5) were tested to validate the supported objectives within a problem-solving approach (see chapter 3, figure 4). The first test was successful and validated the Web-SALTS/Navy OTS and GCSS-MC Interoperability Model (see figure 5 in chapter 3) and the first two supported objectives on the system mechanics line of effort (see figure 4 in chapter 3). The second test partially validated the GCSS-MC and Navy ERP Interoperability Model (see figure 6 in chapter 3) and the last two supported objectives on the system mechanics line of effort (see figure 4 in chapter 3).

Conclusion

In chapter 5, the findings are interpreted and recommendations are provided with the goal of bringing about changes to systems, doctrine, and policy resulting in interoperable supply systems throughout the Department of Defense. The findings are also used to provide recommendations for further research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This research investigates how the Navy and the Marine Corps could increase Naval Logistics Integration (NLI) through interoperable ground supply systems. In this chapter, the findings from chapter 4 are interpreted and recommendations are provided. Next, recommendations for future research are provided. Lastly, a summary and conclusion is provided.

Interpretation of Findings

GCSS-MC, Web-SALTS, Navy OTS, and DAAS Interoperability Test

The GCSS-MC, Web-SALTS, Navy OTS, and DAAS Interoperability Test were highly successful. The test validated the Web-SALTS/Navy OTS and GCSS-MC Interoperability Model (see figure 5 in chapter 3) and the first two supported objectives on the system mechanics line of effort (see figure 4 in chapter 3). The two expected outcomes were observed. The Navy Seabees successfully used Web-SALTS to send requisitions to GCSS-MC via DAAS for subsequent processing. GCSS-MC successfully sent status updates back to Web-SALTS via DAAS. Additionally, the Navy Seabees have successfully used Navy OTS to send requisitions to GCSS-MC via DAAS for subsequent processing, which indicates that the GCSS-MC can interoperate with multiple systems. Similarly, GCSS-MC successfully sent status updates back to Navy OTS via DAAS. These observed outcomes provide evidence that: (1) Web-SALTS and GCSS-MC are interoperable via DAAS; (2) Navy OTS and GCSS-MC are interoperable via DAAS;

(3) A Marine Corps unit using GCSS-MC can support a Navy unit using Web-SALTS, Navy OTS, or a similar system; and (4) DAAS facilitates interoperability between the Navy and Marine Corps.

The test results confirm that GCSS-MC performed as it was designed to do. When GCSS-MC was designed, it was programmed to recognize three types of customers: (1) customers using GCSS-MC; (2) customers using the legacy system SASSY; and (3) external customers using a system external to GCSS-MC (e.g., Army, Navy, Air Force, Coast Guard) (Department of the Navy 2009g). Accordingly, when GCSS-MC receives a requisition from the DAAS inbound interface, GCSS-MC automatically checks to see what type of customer submitted the requisition (Department of the Navy 2009g). This programming logic is necessary so that GCSS-MC will know how to handle sales orders, payments, and status updates (Department of the Navy 2009g).

When GCSS-MC receives a requisition from external organizations via DAAS, payment for the items issued is handled manually outside of GCSS-MC between the Marine Corps and the external organization (e.g., Military Interdepartmental Purchase Request, Order for Work and Services). The reason is that GCSS-MC is not currently designed to generate bills and accept payment from the other military services (Department of the Navy 2009b; Department of the Navy 2009c). Thus, when GCSS-MC receives a requisition from an external organization, GCSS-MC simply creates a sales order and omits any financial logic (Department of the Navy 2009a; Department of the Navy 2009b; Department of the Navy 2009c; Department of the Navy 2009e; Department of the Navy 2009g).

The method for payment is important to understand, because without an established process to track and receive payment for fulfilled requisitions, external organizations have the potential to requisition items from the Marine Corps without subsequent payment. In most situations, external organizations record a financial obligation in their respective financial system to cover the expense. In these situations, the actual payment is coordinated between the Marine Corps and the external organization. However, there is still a possibility that the Marine Corps could issue an item to an external organization and not received a subsequent payment. Thus, this is a potential drawback to interoperability between supply systems.

Additionally, for organizations external to GCSS-MC (and not SASSY), all status updates are sent from GCSS-MC to DAAS (Department of the Navy 2009f). Subsequently, DAAS routes the status updates to the external organization's supply system. This logic is crucial for ensuring that the requesting organization is informed of the status of requisitions. GCSS-MC's ability to receive requisitions from external organizations and provide status back to the requesting organization via DAAS confirms that GCSS-MC is an interoperable supply system.

In the case of SASSY customers, before a requisition is transmitted to GCSS-MC via the SASSY inbound interface, a financial obligation is automatically recorded in the Marine Corps' financial system called, "Standard Accounting Budgeting Reporting System" (SABRS) (Department of the Navy 2009a; Department of the Navy 2009b; Department of the Navy 2009e). Hence, GCSS-MC handles requisitions from SASSY customers in almost the same manner as external customers with the exception that the payment is automated and does not require a manual process (Department of the Navy

2009b; Department of the Navy 2009c). The reason is that GCSS-MC and SASSY both use the same financial system, “SABRS” (Department of the Navy 2009b; Department of the Navy 2009c).

Additionally, for SASSY customers, all status updates are sent directly from GCSS-MC to SASSY via the SASSY outbound interface instead DAAS (Department of the Navy 2009e; Department of the Navy 2009f). This confirms that GCSS-MC can use an interface as an alternative to DAAS in order to communicate with external supply systems. Also, status updates originating from external suppliers via DAAS are sent to GCSS-MC for subsequent routing to SASSY customers. Additionally, GCSS-MC routes unfulfilled SASSY requisitions to DAAS for subsequent routing to a supplier. Thus, GCSS-MC essentially acts as an intermediary routing service for SASSY to communicate with DAAS (Department of the Navy 2009a; Department of the Navy 2009e; Department of the Navy 2009f; Department of the Navy 2009g).

In general, most Marine Corps units have transitioned from the legacy system “SASSY” to the new system “GCSS-MC.” So, the SASSY logic is only really useful for GCSS-MC to communicate with the few Marine Corps units that still use SASSY. However, this logic could be used as an example of how GCSS-MC could communicate with another system via an interface. Moreover, the SASSY logic confirms that GCSS-MC is flexible enough to interoperate with multiple systems via DAAS or an interface.

The initial tests conducted involved the Navy Seabees using Web-SALTS to create requisitions. Recently, the Navy Seabees have transitioned to Navy OTS. Since the transition, the Navy Seabees have successfully used Navy OTS to create approximately 30 additional requisitions that have been fulfilled by the SMU. This indicates that the

process (see figure 5 in chapter 3) works and is repeatable for multiple systems. This also indicates that the increase of inter-service requisitions from the Navy Seabees to the SMU is relatively low considering that 3rd Supply Battalion's SMU supports an average of about 52,000 Marine Corps units' requisitions per year at a value of approximately $30 million. Thus, it is not likely that increasing interoperability between supply systems will lead to a significant increase in inter-service supply support. However, interoperable supply systems will provide the Navy and Marine Corps with the flexibility of sourcing from each other's inventories, which is especially beneficial in a deployed environment for obtaining critical items that are scarce in supply or that are expensive to expedite shipment.

GCSS-MC, Navy ERP, and DAAS Interoperability Test

This test was successful and partially validated the GCSS-MC and Navy ERP Interoperability Model (see figure 6 in chapter 3) and the last two supported objectives on the system mechanics line of effort (see figure 4 in chapter 3). The expected outcomes were partially observed. The SMU was able to use GCSS-MC to create a requisition with NAVSUP specified as the intended supplier. However, DLA Transaction Services prevented the requisitions from being routed to NAVSUP via DAAS for subsequent processing. Consequently, NAVSUP never received the test requisitions and was incapable of routing the requisitions to an FLC for subsequent fulfillment or furnishing supply statuses back to GCSS-MC via DAAS.

This test revealed some key lessons learned. First, IGC's AV is a key enabler for facilitating interoperability between the Navy, Marine Corps, and Joint services. AV is an invaluable tool that enables the military services to locate available retail and wholesale

inventories throughout DOD. AV also provides the flexibility of locating inventories based upon a variety of item identifiers such as a DODAAC, RIC, National Stock Number (NSN), National Item Identification Number (NIIN), Part Number, and Department of Defense Identification Code (DODIC). AV provides the military services with several options with regards to where inventory can be sourced as opposed to simply sending every requisition to the default supplier. Essentially, AV allows for establishment of vertical and horizontal support relationships between the military services and external suppliers. This is essential to decreasing supply chain response times and improving military readiness.

Another lesson learned is that GCSS-MC's sourcing rules is another key enabler to facilitating interoperability with the Navy and other Joint services. GCSS-MC's sourcing rules is an essential capability that can provide Marine Corps units with the flexibility of specifying a preferred supplier; internal or external to GCSS-MC. While AV is a capability that allows for the timely location of available assets, GCSS-MC's sourcing rules is a key tool that can enable Marine Corps unit to bypass the normal routing and send requisitions to other available sources of supply.

Specifically, within GCSS-MC only, horizontal and vertical support relationships exist. Vertical support relationships are the most common whereby Marine Corps units generally submit requisitions first to the SMU for fulfillment before the requirement is backordered, passed to next source of supply (e.g., DLA), or cancelled (e.g., requisition is for a terminal item). Occasionally, within GCSS-MC only, Marine Corps units have the option to source an item from a lateral Marine Corps unit that also uses GCSS-MC. However, Marine Corps units are incapable to source items laterally from an organization

external to GCSS-MC (e.g., Navy, Army, Air Force, etc.) or bypass the SMU and go directly to a source of supply, because Marine Corps units do not have access to modify sourcing rules within GCSS-MC.

Some might argue that a Marine Corps unit should never bypass the SMU and go directly to another source of supply, but there is evidence that says otherwise. For instance, in March 2012, units from 3rd Supply Battalion participated in exercise Freedom Banner in South Korea. During this exercise, the author oversaw a supply detachment that was responsible for providing general supply support to III MEF units participating in the exercise. The supply detachment deployed with approximately 600 commonly-used critical repair parts in the event that a weapon system malfunctioned and required repair. There were instances when a particular part was required, but was not available in the supply detachment's local inventory. Accordingly, the supply detachment had a decision an important decision to make with regards to how to source the item. The supply detachment could simply forward the request to the SMU located in Okinawa. This decision makes sense if the item were only available at the SMU in Okinawa, but not available locally in South Korea. However, that was not always the case. There were a few other options with regards to available sources of supply in South Korea such as Army supply points, a DLA Distribution Point, and a General Services Administration (GSA) store. Knowing this, the supply detachment used AV to identify the items carried locally by DLA. Once the items were identified, the supply detachment had the GCSS-MC Helpdesk modify the sourcing rules for these items so that any requisitions for these items would be sent directly to DLA if the item could not be fulfilled from the supply detachment's local inventory. The supply detachment also changed its Transportation

Account Code (TAC) 1 and 2 addresses in DAAS to reflect the supply detachment's physical location in South Korea. It was important for DLA's Inventory Control Point (ICP) to know that the supply detachment was located in South Korea so that DLA's ICP would release the MRO to the DLA Distribution Point in Korea. It several instances, this logic worked and the supply detachment received items faster than it normally would have if the requirement were sent to the SMU in Okinawa. Yet, this method was not always reliable as DLA's ICP sometimes released the MRO to Distribution Depot outside of South Korea even though the requirements were available locally. The overall points of this example is: (1) that there is tremendous value in horizontal and vertical support relationships made possible through interoperability and (2) GCSS-MC's sourcing rules are critical to facilitating interoperability.

In developing this test, an interesting discovery was made pertaining to NAVSUP, the FLCs, and DLA. Although NAVSUP WSS plans and procures wholesale inventory using Navy ERP, DLA manages the Navy's wholesale inventories within FLCs using DLA's Distribution Standard System (DSS). Additionally, NAVSUP WSS's wholesale inventories are accounted for using a DLA DODAAC and RIC instead of a Navy DODAAC and RIC. Conversely, NAVSUPP WSS has a Navy DODAAC and RIC that is associated to Navy ERP. Accordingly, it can be inferred that the Navy has essentially assimilated its inventory into DLA's inventory. It can also be inferred that the Navy still decides what to stock and how much, but the inventory is essentially integrated into DLA's inventory. That being said, it makes sense that DLA Transaction Services rerouted the test transactions to DLA instead of NAVSUP, because the inventory can be fulfilled from any DLA Distribution Depot and DLA's ICP decides where to release an

MRO. Plus, the bulk of the test results reveal that DLA's ICP fulfilled the test requisitions from DLA Distribution Points that were in closer proximity to the SMU than the FLCs that carried the items.

Since the test requisitions were never routed to NAVSUP via DAAS, it could not be determined whether or not GCSS-MC and Navy ERP are interoperable. It is assumed that these two systems are interoperable, but DLA Transaction Services is merely inhibiting communication. One possible explanation could be that the DLMS transaction was not formatted properly when it was sent to DAAS. Specifically, GCSS-MC uses the DLMS transaction set, "511R" to format requisitions (Department of the Navy 2009d). Within the 511R transaction, there is a section titled "Name" that identifies an organization (Defense Logistics Agency 2014a). In this section, the Marine Corps defaults every requisitions with a value of "Z4", which translates to "Owning Inventory Control Point" (Defense Logistics Agency 2014a; Department of the Navy 2009d). The Owning Inventory Control Point is used to indicate the primary source of supply for an item (Defense Logistics Agency 2014a). Since DLA was the primary source of supply for the test items, it could be that DLA recognized that the Owning Inventory Control Point was incorrect and edited the transactions for routing to DLA. That being said, perhaps the value entered in the 511R transaction should have been different parameter such as "Z3" for Potential Source of Supply. The "Z3" has two purposes: (1) requisitioning nonstandard material and (2) used for intra-USAF lateral requisitions and to identify the DOD Source of Supply (Defense Logistics Agency 2014a). While the test transactions do not exactly fit into the criteria defined for the use of the "Z3", this was the only plausible explanation for why the transactions were rerouted. That being said, the Navy and Marine

Corps could request that the purpose of the "Z3" data field be expanded to allow for interoperability between the Navy and Marine Corps ground supply systems.

From a wholesale inventory perspective, interoperability between GCSS-MC and Navy ERP probably does not matter because: (1) the Navy and DLA's wholesale inventories are essentially the same and (2) GCSS-MC is interoperable with DLA. However, from a retail inventory perspective, interoperability between GCSS-MC and Navy ERP is important especially if the Navy units that own the retail inventory are using Navy ERP. For example, a Marine Expeditionary Unit (MEU) may need to source an item using GCSS-MC, from a Navy unit using Navy ERP, on an adjacent ship. In this hypothetical situation, it does not make sense for the MEU to requisition the item from DLA as the item is available and can be fulfilled faster from an adjacent Navy unit. Thus, under these circumstances, interoperability between GCSS-MC and Navy ERP is valuable.

Perhaps DAAS is not the only answer to increasing interoperability between GCSS-MC and Navy ERP. A direct interface between the two systems could possibly achieve the same effect. Presently, both systems have several interfaces that enable communication with various external systems, so a direct interface between GCSS-MC and Navy ERP is a viable option (Government Accountability Office 2012). The obvious benefit of a direct interface between the two systems is interoperability between GCSS-MC and Navy ERP. However, this interoperability primarily exists between the Navy and Marine Corps. If interoperability with the other services is desired, then additional interfaces may be required. The proliferation of direct interfaces between systems has the potential to be costly and difficult to manage especially with regard to configuration

management. Specifically, if one service alters its system's design, there is a potential that the change will impact the efficiency of the interface between the two systems. Moreover, standardization amongst the services may be jeopardized by relying on multiple customized interfaces between systems as opposed to the flexible capabilities inherent in DAAS and with the DLMS logic (see chapter 2). With this in mind, perhaps the logic in DAAS may need to be revised to accommodate improvements in the Navy and Marine Corps' technological capabilities and facilitate better interoperability between the ground supply systems.

Recommendations

Based upon interpretations of the findings, several recommendations on how to improve interoperability can be made. First, it may be worthwhile for the Marine Corps to design into GCSS-MC an inbound web-service from IGC's AV to enable GCSS-MC users to conduct stock checks of retail and wholesale inventories throughout DOD. As mentioned in chapter 2, GCSS-MC has four outbound web services to four different systems that provide various management reports. In particular, GCSS-MC has an outbound web-service that transmits the Marine Corps' retail inventories and equipment totals to IGC's AV. In turn, AV assimilates this information with the other military services' retail inventories, wholesale inventories, and equipment totals in order to create total asset visibility reports. AV reports aid in the timely location of available items throughout DOD. This is invaluable especially in terms of locating items that are subject to Diminishing Manufacturing Sources and Material Shortages (DMSMS).

The research findings indicate that in designing a web-service to import data from AV, it is not necessary to import into GCSS-MC every single inventory record from AV.

Doing so is duplicative and may lead to system performance problems. If a GCSS-MC user needs to view all AV records, then he or she should use AV instead. But, if a GCSS-MC user needs to quickly locate an item, then it would be beneficial to have a capability within GCSS-MC that enables a user to search for a particular item or batch of items and almost instantaneously retrieve available balances throughout DOD via a web-service from AV. Subsequently, in theory, the GCSS-MC user could screen the available sources of supply, select a supplier, and submit a requisition for routing directly to the specified supplier. Currently, Navy OTS provides a similar capability called "Stock Check" (Naval Supply Systems Command 2007). Screenshots of Navy OTS's "Stock Check" capability is provided in Appendix G to show how this capability could be useful for the Marine Corps.

Besides the inbound web service from AV, the research findings suggest that it is beneficial for the Marine Corps to delegate the ability to modify GCSS-MC's sourcing rules from the Helpdesk to the unit-level. In a combat environment, Marine Corps units cannot afford to wait for the GCSS-MC helpdesk to work trouble tickets so that the unit can source critical items from a nearby source of supply. Besides the inconvenience, the inability to rapidly source critical items can jeopardize mission success. At a minimum, the SMU and the Major Subordinate Command (MSC) G4s should have access to this capability and permission to modify the sourcing rules. As mentioned earlier in this chapter (see Interpretation of Findings), GCSS-MC's sourcing rules is a key enabler to facilitating interoperability between the Navy and the Marine Corps. GCSS-MC's sourcing rules can provide Marine Corps units with the flexibility of specifying a preferred supplier; internal or external to GCSS-MC. The ability to source items from a

variety of suppliers, as opposed to the traditional vertical support relationship between the SMU and the units, may contribute to decreased procurement lead times and improved readiness.

It is understood that permitting units to source from outside of the SMU may require workarounds to capture historical demand data needed to drive inventory planning.[22] As a result, it is also understood that over time the SMU's inventory may shrink. Therein is the potential benefit. Specifically, the ability for units to use a variety of sources of supply, as opposed to one stockpile may enable the SMU to reduce its logistical footprint. A reduced logistics footprint will enable the SMU to right-size its inventory and improve mobility by focusing on only stocking regularly-requested, critical items. Meanwhile, the supported units may maintain equal or greater readiness due to improved procurement lead time.

In addition to delegating the ability to modify sourcing rules, the research findings indicate that the Marine Corps should delegate the ability to setup customers in GCSS-MC to the SMU and the MSC G4s. Delegation of this responsibility may facilitate the timely establishment of support relationships with military units from other branches of

[22]In the legacy system Supported Activities Supply System (SASSY), requisitions processed during the SASSY cycle generated historical demand that was used for inventory planning. When units requisitioned items outside of SASSY (e.g., used a system or process that did not process requisitions through SASSY), SASSY was deprived of the demand data necessary to plan inventory. As a result, the SMU would no longer procure the item which resulted in inventory stock outs. Presently, with the exception of a couple systems, units are primarily restricted to using GCSS-MC to requisition items. Thus, as long as a unit creates a requisition using GCSS-MC, the historical demand is recorded in GCSS-MC. However, if a unit uses GCSS-MC to requisition an item outside of the SMU, then the SMU does not have a sales order created that would document that the SMU issued that item to a unit. The effect of not having a sales order is almost the same as when units requisitioned outside of SASSY with the exception that the demand history is resident in GCSS-MC.

service. This is absolutely critical in a combat environment where units and mission success are dependent on the ability to provide and obtain support. Both the SMU and the MSC G4 organizations have the requisite mix of personnel to ensure proper oversight of this capability. Moreover, the SMU and the MSC have comptroller officers that can ensure timely payments occur between the Marine Corps and other branches of service. Thus, delegation of the ability to setup customer in GCSS-MC to the SMU and MSC G4 is feasible and necessary.

This research findings indicate that in sending transactions to DAAS for subsequent routing to another unit or supplier, the Navy and Marine Corps should use an organization's DODAAC instead of a Routing Identifier Code (RIC). For the most part, RICs are primarily limited to wholesale suppliers (i.e., Defense Logistics Agency, General Services Administration, and Naval Supply Systems Command) and retail suppliers (e.g., Supply Management Unit). Every military unit does not have a RIC. Since RICs are restricted to three characters (e.g., MR1), it is not possible to assign every single military unit a RIC. However, there are approximately 128,745 DODAACs assigned to military units (Defense Logistics Agency 2014b). Unlike the RIC, DODAACs are six characters in length, which allows for the creation of additional DODAACs to assign to new or temporarily established military units. Review of the DLMS transaction formats (see Appendix C) shows that DLMS provides the flexibility of routing transactions between organizations based upon different parameters such as the DODAAC, RIC, or Military Assistance Program Address Code (MAPAC).[23] Traditionally, military units

[23]A MAPAC is a "code constructed by the International Logistics Control Office (ILCO) for security assistance program shipments. MAPAC is used to identify the

have always sent requisitions to a supplier with RIC; regardless of whether or not the item was available for issue. Normally, DAAS routed these requisitions to the supplier via the supplier's RIC. However, given the inherent flexibility of DLMS, military units could potentially use a DODAAC instead of a RIC to send requisitions directly to another military unit that has items available for issue, via DAAS. In turn, the supporting unit could theoretically send status updates back to the supported unit via DAAS. Thus, the research findings suggest that the Navy and Marine Corps should adopt the use of the DODAAC for routing requisitions instead of the RIC.

One way to improve interoperability amongst the Navy and Marine Corps' ground supply systems is to universally implement sales order generation logic similar to the Marine Corps' for requisitions received via DAAS. As mentioned in chapter 2, when GCSS-MC receives a requisition from another military service, GCSS-MC internally creates a sales order to fulfill the requisition (Department of the Navy 2009g). Subsequently, as the sales order is processed through to completion, GCSS-MC communicates status updates back to the requesting military service via DAAS (Department of the Navy 2009f). Hence, if the Navy and Marine Corps implement this logic universally into each service's respective ground supply system, then the Navy and Marine Corps could achieve greater interoperability between ground supply systems. Moreover, this logic is especially beneficial for the Marine Corps in seamlessly attaining

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consignee in transportation documents and to obtain clear-text address and other shipment information from the military assistance program address directory (MAPAD)" (Department of Defense 2012a, AP2-19). Presently, there are "over 11,300 MAPACs" that can be used by "country representatives, freight forwarders and customers-within-country required for releasing Foreign Military Sales (FMS) and Military Assistance Program (MAP) Grant Aid shipments" (Defense Logistics Agency 2014e).

supply support for commonly used items from the Army; especially in a deployed environment.

As mentioned earlier in this chapter (see Interpretation of Findings), the Navy and the Marine Corps should request that the purpose of the "Z3" data field (i.e., Potential Source of Supply) in the DLMS 511R transaction be expanded to allow for greater interoperability between the Navy and Marine Corps ground supply systems. Specifically, Navy and Marine Corps could build logic into their respective system that recognizes when a unit is trying to requisition an item from alternate source of supply. This logic would then automatically use the "Z3" data field (Potential Source of Supply) instead of the "Z4" data field (Owning Inventory Control Point) to inform DAAS of the preferred source of supply. This would ensure that DAAS routes the requisition to its intended source of supply as opposed to editing the transaction and sending it to the primary source of supply.

Since the initial interoperability tests between the SMU and the Navy Seabees, the SMU has developed and published standing operating procedures (SOP) on how to use GCSS-MC to establish support relationships with the Navy and other military services (United States Marine Corps 2013a). Collectively, the SMU and Navy Seabees have worked through initial difficulties and streamlined the process of the SMU providing support to external units. Thus, the Marine Corps should incorporate this SOP into its NLI Playbook.

Besides the NLI Playbook, the Navy and Marine Corps need to develop and publish policy that stipulates under what conditions inter-service supply support is authorized. In general, inter-service supply support should supplement the Navy's or the

Marine Corps' supply chain; not replace it. For instance, policy could include various criteria such as in a deployed environment inter-service supply support is authorized: (1) to minimize transportation costs, (2) for critical repair parts for mission essential equipment, or (3) for scarce items (e.g., DMSMS) that are not available via the normal supply chain. In the absence of policy and controls, there is a risk that a supported service could quickly deplete another supporting service's inventory thereby jeopardizing the supporting service's ability to maintain sufficient stockage levels to support to its organic units.

Along with policy, the Navy and Marine Corps need to evaluate how inter-service requisitions will compete on a priority basis. Presently, the Navy and Marine Corps use a priority system that stipulates the relative importance of a unit's requisition based upon its Force/Activity Designator (F/AD) (relates to unit's mission) and the Urgency of Need (UND). In conjunction with a Required Delivery Date (RDD), the priority system is used so that a supporting organization knows how soon the supported unit needs an item. The priority system is also used to prioritize which requisitions are supported first. In general, the priority system is effective. However, the priority system becomes complicated when there are multiple requisitions with the same priority and same RDD for a particular scarce item. Thus, the Navy and the Marine Corps need to evaluate the existing priority system to ensure fairness and that readiness is not unreasonably jeopardized for any unit.

Recommendations for Further Research

Based upon the research, there are four areas that require further research. First, this research only tests interoperability between Navy and Marine Corps ground supply systems. For that reason, research involving interoperability tests between Global Combat

Support System-Marine Corps (GCSS-MC) and Global Combat Support System-Army (GCSS-A) would provide invaluable insight as to how well these systems would perform together; especially in a deployed environment.

Second, this research did not consider that it may be possible for the Marine Corps' ground supply and maintenance personnel to use Navy systems such as the Naval Tactical Command Support System (NTCSS) (see Appendix A for description of the system). Presently, the Marine Corps' aviation supply and maintenance personnel use NTCSS in conjunction with the Navy. Thus, research to determine the feasibility of the Marine Corps' ground and supply personnel using NTCSS is valuable.

Third, this research did not assess whether or not it is possible to reengineer Navy One Touch Support (OTS) so that it can be used by Marine Corps personnel as an alternative requisitioning tool to GCSS-MC. Reengineering Navy OTS may ensure that the Marine Corps' financial systems of record are automatically updated and requisition-related records are synchronized in GCSS-MC. Thus, a cost benefit analysis is useful in determining the feasibility.

Lastly, this research documented how the SMU received payment for items issued to the Navy. However, this research did not consider ways to improve financial interoperability between the Navy and the Marine Corps and automate billing. Further research should assess the feasibility of the SMU using a Revolving Fund (e.g., Naval Working Capital Fund) to finance inventory operations and if it will enable the SMU to generate bills.

Conclusion

This research investigated how the Navy and the Marine Corps could increase NLI through interoperable ground supply systems. Through interoperable ground supply systems, the Navy and Marine Corps can potentially achieve sustained readiness with smaller inventories, reduced transportation backlogs, and reduced transportation costs associated with expediting shipments into hard-lift areas. Although the potential savings is difficult to quantify, based upon the shipment losses incurred during Operation Iraqi Freedom, interoperable supply systems coupled with In-transit Visibility technologies could potentially save billions over time in a conflict spanning several years such as Operation Iraqi Freedom or Operation Enduring Freedom.

This research is significant because it proves that the Marine Corps' supply system GCSS-MC is interoperable and fully capable of processing requisitions received from the Navy via DAAS. Moreover, if the other military services replicate the GCSS-MC's logic for processing inter-service requisitions, then interoperability can be achieved across all of the military services' supply systems leading to improved inter-service supply support. This is critical in a deployed environment where resources are limited, procurement lead times are long, and the success of operations and particularly lives depend upon the ability to provide and receive timely support.

GLOSSARY

Accountable Property Systems of Record (APSR). The APSR is the government information system used to control and manage accountable property records. It represents the "official" record keeping system for controlling government property. To be considered an APSR, the system must be able to perform property management functions capturing all life cycle events affecting the assets. The APSR must be integrated with the core financial system(s) and must maintain an auditable record of all life cycle events. Individual property records must be maintained for each asset managed in the APSR. Examples of Marine Corps APSRs include, but are not limited to, Global Combat Support System-Marine Corps (GCSS-MC) or Stock Control System (SCS) for military equipment or Defense Property Accountability System (DPAS) for general equipment (Department of the Navy 2014).

Consumer-Level of Inventory. An inventory, regardless of funding source, usually of limited range and depth, held only by the final element in an established supply distribution system for the sole purpose of internal consumption (Department of the Navy 1992).

Defense Logistics Management Standards (DLMS). DLMS exists as a DOD enterprise logistics services provider responsible for managing and administering the electronic implementation of DOD-wide logistics materiel management operations through electronic business systems, the business rules that govern logistics business processes in electronic systems, and the standards for electronic data interchange between logistics business systems. DLMS is responsible for managing the structure of electronic business transactions, data interchanges and business rules that enable accurate and interoperable logistics operations to occur between DOD and external logistics activities at any level of the DOD organizational structure. DLMS provides business rules, standard procedures and data formats to link the various component organizational elements of the defense logistics community including: inventory control points, distribution depots, maintenance depots, transportation nodes, and end users in posts, camps, stations, ships, and with deployed units. DLMS also provides standards for electronic interchange of data (exchange of business data in a standard format between entities) across the military services, defense agencies, other federal agencies, foreign military sales customers and non-government participants (Department of the Navy 2014).

Department of Defense Activity Address Code (DODAAC). The DODAAC is a six-position code that uniquely identifies a unit, activity, or organization. The first position designates the particular service/agency element of ownership. An alpha character in the first position indicates DOD, and a numeric character in the first position indicates non-DOD. The remaining five positions are assigned by the service. Two general categories of DODAACs applicable to the Marine Corps:

"M" prefixed codes, identifying Marine Corps units of the functional areas within a Marine Corps activity; and, "L" prefixed codes, identifying contractors with which the Marine Corps conducts business (Department of the Navy 2014).

Department of Defense Activity Address Directory (DODAAD). The DODAAD is an interactive relational database serving as a single authoritative source of identification, routing and address information for authorized uses, including military components and agencies, participating federal agencies, authorized contractors and authorized special program activities, such as state and local governments. DODAAD supports business application systems data and interoperability requirements, including, (but not limited to) supply chain, materiel management, distribution, transportation, maintenance, finance, and acquisition systems. Among other uses, DODAAD information is used throughout the FSS for identification, requisitioning, shipping and billing (Department of the Navy 2014).

Fleet Logistics Center (FLC). Command organizations which furnish supply support to fleet units, shore activities, and overseas bases established in their mission. They are under the management of the Commander, Naval Supply Systems Command (NAVSUP) (Naval Supply Systems Command 1998b; Naval Supply Systems Command 2013).

Force or Activity Designator (F/AD). A Roman numeral (I to V) that the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, or a DOD Component assigns to a unit, organization, installation, project, or program to indicate its relative mission essentiality. The F/AD is an integral part of the Uniform Materiel Movement and Issue Priority System (UMMIPS) (Department of Defense 2014).

Global Combat Support System-Marine Corps (GCSS-MC). GCSS-MC is a Marine Corps specific logistics chain management system which provides cross-functional information to enhance ground supply and maintenance operations. The Marine Corps utilizes GCSS-MC as an Accountable Property Systems of Record for military equipment (Department of the Navy 2014).

Intermediate-Level of Inventory. An inventory, regardless of funding source, that is required between the consumer- and wholesale-levels of inventory for support of a defined geographic area or for tailored support of specific consumer organizations or activities (Department of the Navy 1992).

Interoperability. (1) The ability to operate in synergy in the execution of assigned tasks. (2) (DOD only) The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases (Department of the Navy 2010c).

Inventory Control Point (ICP). The organizational element within a distribution system which is assigned responsibility for system-wide control of material. In a centralized inventory control system, the inventory control point also may perform the functions of a stock control activity (Naval Supply Systems Command 1998b).

Liquidation. A liquidation is the payment for goods or services that were ordered and received. Liquidations or payments are made after the finance officer receives an invoice from a vendor or government agency requesting payment (Department of the Navy 2014).

National Item Identification Number (NIIN). The NIIN is the last nine digits of the National Stock Number (NSN) that differentiates each individual supply item from all other supply items. The first 2 digits signify the National Codification Bureau that assigned the NIIN, while the last 7 digits are non-significant and are sequentially assigned by the Federal Logistics Information System (FLIS) (Department of the Navy 2014).

National Stock Number (NSN). The NSN is a 13 digit number that is used to identify items, and is assigned by Federal Logistics Information System (FLIS) to convey specific information about an item of supply. It is comprised of the Federal Supply Class (FSC), which is four digits, and the National Item Identification Number (NIIN), which is nine digits (Department of the Navy 2014).

Naval Logistics Integration (NLI). A coordinated Navy-Marine Corps effort to establish an integrated naval logistics capability that can operate seamlessly whether afloat or ashore (Department of the Navy 2010c).

Naval Supply Systems Command (NAVSUP). Provides for and meets those material support requirements of the Department of the Navy within the assigned material support responsibility of the Naval Supply Systems Command. They provide supply management with policies, methods, and staff assistance to the Assistant Secretary of the Navy (Naval Supply Systems Command 1998b).

Obligation. A definite commitment that creates a legal liability of the government for the payment of goods and services ordered or received, or a legal duty on the part of the United States that could mature into a legal liability by virtue of actions on the part of the other party beyond the control of the United States. Payment may be made immediately or in the future. An agency incurs an obligation, for example, when it places an order, signs a contract, awards a grant, purchases a service, or takes other actions that require the government to make payments to the public or from one government account to another. Once funds are obligated, the official unobligated available balance of the fund manager's account is decreased. An obligation may be de-obligated when both parties agree and supporting documentation is provided to update the accounting system (Department of the Navy 2014).

Requisition. The process in which a request is validated and entered into a process or system to facilitate its fulfillment. The requisition action generates an obligation in the fiscal cycle (Department of the Navy 2014).

Retail Inventory. Supplies/materiel held below the wholesale-level (the intermediate- and consumer-levels of inventory) (Department of the Navy 1992).

Seabasing. The deployment, assembly, command, projection, reconstitution, and re-employment of joint power from the sea without reliance on land bases within the operational area (Department of the Navy 2010c).

Stock Point. Shore activities with large customer bases, high throughput, and/or large amount of stock under management (Department of the Navy 2007).

Storage Activity. The organization that is assigned responsibility for the physical handling of material, incident to receipt storage, selection, and shipment (Naval Supply Systems Command 1998b).

Supply Management Unit (SMU). The mission of the Supply Management Unit is to provide general support, intermediate ground supply support, and materiel distribution support to the Marine Expeditionary Force (MEF) (United States Marine Corps 2012). The SMU's tasks are to: (1) Provide intermediate ground supply support and centralized supply chain management for Classes II, III (p), IV and IX in support of the MEF; (2) Provide accounting, warehousing, storage, care-in-storage, and issue support for initial issue items in support of the MEF. (3) Provide subsistence support to the MEF, to include operation of Class I subsistence dumps, storage, issue, and accounting for subsistence items; (4) Provide management of the MEF's special training items; and (5) Provide general support materiel distribution support and asset visibility for the sustainment of MAGTF operations (United States Marine Corps 2012).

Urgency of Need Designator (UND). The UND is used to express the urgency of need for an item for the end use by the requesting unit (Department of Defense 2014).

Wholesale-Level of Inventory/Supply. Inventories, regardless of funding source, over which an inventory manager at the ICP level has asset knowledge and exercises unrestricted asset control to meet worldwide inventory management responsibilities (Department of the Navy 1992; Naval Supply Systems Command 1998b).

APPENDIX A

NAVY LOGISTICS SYSTEMS

This is a list of the Navy's logistics systems. Some of these systems are used by the Navy and Marine Corps for aviation supply and maintenance operations. With the exception of the Marine Expeditionary Units (MEU), the Marine Corps does not use these systems for ground supply or maintenance.

System	**Description**
Navy Enterprise Resource Planning (ERP)	The Department of the Navy (DON) financial system of record. Provides financial, acquisition, and supply management functionality to the Navy's major commands. A powerful business system with over 64,000 users around the world. Approximately 50 percent of the Navy's budget is currently executed within Navy ERP. Functions performed within Navy ERP include: •Accounts Payable & Receivable •Asset Accounting •Billing Management & Operations •Contracts, Funding Documents, MILSTRIP, P-Card, & Training Documents •CPP Asset Authority Administration and Analysis •Carcass Tracking Analysis •Cash Management •Civilian & Military Manning •Cost and Activity Planning •Customer Order Operations & Supervision •Customer Service •Delivery Monitor - Reimbursable & Supply •Down payment, Entitlement, and Invoice Processing •Equipment •Fixed Asset Physical Inventory Activities •Forecasting, Inventory Planning, & Operational Supply Planning •Funds Allocation & Execution •General Ledger Management •Goods Issue Delivery •HAZMAT Customer Order Operations & Sales Quotations •Investment Management Maintenance •Management & Non-Navy Personnel Administration •Material Movement Operations & Supervision •Operations (OPS) Research •Organizational Structure Maintenance •Overhead Allocation •Payment File Certification •Performance Appraisal Administration •Period End Activities in Asset Accounting, Closing, and Settlement •Physical Inventory Operations & Supervision •Procurement Workflow Approval •Project Business Financial Manager, EVM Specialist, & Project Manager •Purchase & Ship Contract Requisitioning •Reimbursable Billing & Sales Monitor •Team Leadership, Administrator, Approval, Certification, and Time Keeper

System	Description
	•Training Administration &Management •Warehouse Operations & Supervision •Workforce Team Management •Year-end Closing in Asset Accounting
Navy One Touch Support (OTS)	This web-based system facilitates access to supply information. The system's functions include technical screening, stock check, requisitions input, requisition status, requisition audit, shipment status, file/text upload, batch queries, order list, PIR/Backorders, MILSTRIP templates, and purchasing. The system's data sources include: •Air Force Material Command (AFMC) •Army Logistics Integrated Data Base (LIDB) •Business System Modernization (BSM) •Dalsey Hillblom Lynn (DHL) •Defense Automatic Addressing System (DAAS) •Defense Reutilization and Marketing Service (DRMS) •Distribution Standard System (DSS) •Federal Express (FEDEX) •Federal Logistic Information System (FLIS) •Force Inventory Management Analysis Reporting System (FIMARS) •Global Transportation Network (GTN) •Integrated Submarine Information System (ISIS) •Logistics Information and Processing System (LIPS) •Logistics Support Center Customer Asset Visibility (LCAV) •Navy Transaction History File (THF) •Real-time Reutilization Asset Management (RRAM) •SNAPSHOT or Mechanicsburg/Philadelphia or Uniform Inventory Control Point (UICP) •Standard Automated Material Management System (SAMMS) •Stock Control System (SCS) •Uniform Automated Data Processing System for Stock Points (UADPS) •United Parcel Service (UPS) •Virtual Master Stock Inventory Record (VMSIR) •Worldwide Port System (WPS)
Micro-Shipboard Non-Tactical Automated Data Processing System (MicroSNAP)	A suite of selectable software applications primarily for military operations that provides the smaller operating forces with maintenance and supply functions based on particular operational needs, keeping Naval expeditionary forces, various support units, and multiple shore-based Commands in peak operating condition with accurate, timely, and relevant maintenance, supply, and financial information. The MicroSNAP suite consists of: •Maintenance and Operations Support System (MOSS) •Organizational Maintenance Management System (OMMS) •Supply and Financial Management (SFM) System •System Management System (SMS)
Naval Aviation Logistics Command Information System (NALCOMIS)	An automated information system that provides aviation maintenance and material management personnel with timely, accurate and complete information on which to base daily decisions. It is a single, integrated, real-time automated system that supports workers, supervisors and managers. NALCOMIS features an automated source data entry device for simplifying and improving data collection, while also furnishing a means to satisfy the Naval Aviation Maintenance Program (NAMP) requirements. The NALCOMIS application has two configurations: •Optimized Organizational Maintenance Activity (OOMA) •Optimized Intermediate Maintenance Activity (OIMA)

System	Description
Naval Tactical Command Support System (NTCSS)	A multi-application information system program that provides standard information resource management to afloat and shore-based fleet activities. NTCSS was established by the merger of three key programs: The Shipboard Non-Tactical Automated Data Processing Program (SNAP), the Naval Aviation Logistics Command Management Information System (NALCOMIS), and Maintenance Resource Management System (MRMS). NTCSS provides a full range of standardized mission support automated data processing (ADP) hardware and software to support management of logistics information, personnel, material, equipment maintenance, and finances required to maintain and operate ships, submarines, and aircraft in support of the Navy and Marine Corps. Major components include: •R-ADM •RSupply •OMMS-NG •NALCOMIS
Organizational Maintenance Management System-Next Generation (OMMS-NG)	Provides Navy maintenance personnel with quick, convenient access to the maintenance information they need to ensure warship readiness. Such information includes information concerning configuration items, work candidates, and ordering parts for equipment. OMMS-NG tracking assists shipboard personnel in the planning, scheduling, and reporting of maintenance and related logistics support actions. This application interfaces with other applications in the NTCSS suite including RSupply. It also interfaces with shore activities that need ship and sub configuration, maintenance, and logistics information. OMMS-NG increases a ship's availability for fleet operations, standardizes surface ship maintenance practices, levels loading of repair activities, and reduces cyclic costs of repairs, ensuring combat readiness.
Relational Administrative Data Management (R-ADM)	Automates personnel management for the US Naval Fleet. R-ADM uses tools, utility programs, and functions in managing the major aspects of personnel data. In addition to providing numerous tools, utility programs, and functions, R-ADM generates formatted reports for each function. Reports are displayed on the screen, allowing users to preview them and print them. One of the more significant features offered in R-ADM is the capability to quickly single out a member's record from any function and to act on or review the information for that member in all functions to which the user has been granted access. Another equally important feature is the capability to record the same information for multiple members simultaneously. The term “multiple” means from two to the whole Command.

System	Description
Relational Supply (RSupply)	Provides Navy and Marine Corps personnel the tools and functions necessary to perform their day-to-day business: ordering, receiving, and issuing of services and materials; maintaining financial records; and reconciling supply, inventory, and financial records with the shore infrastructure. The major functions of RSupply are divided into the following subsystems: •Site — Contains information on your own site, serial numbers, user access, validation tables, fund codes, default values, and maintenance data •Inventory — Provides automated procedures to ensure that physical stock and stock records agree, allowance lists are accurate, usage data is evaluated correctly, and material requirements are anticipated. In addition, it provides programs the ability to balance material requests against available funds and purge storerooms of stock no longer applicable to supported units. •Logistics — Provides automated procedures to create MILSTRIP requisitions, receive and store material, issue material to supported and non-supported customers, process incoming and outgoing supply status, process carcass tracking inquiries and replies, and update all logistics data files. •Financial — Provides automated procedures for assimilating and reporting financial credits and expenditures. Provides an automated reconciliation tool for processing of Summary Filled Order Expenditure Difference Listings (SFOEDL) manually or through a SMARTS file input as well as Aged Unfilled Order Listings (AUOL). •Query — Provides a real-time automated means of querying data required in decision making, providing status and determining the posture of onboard spares. •Interface — Provides the interfaces required to communicate RSupply information to OMMS-NG and NALCOMIS as well as receive data updates.
Maritime Medical Modules (MMM)	An automated, multi-user medical support application, formerly known as SAMS, that tracks medical and dental readiness of operational units such as Sea, Air and Land (SEAL) teams, Construction Battalions (Seabees), Marine Expeditionary Units, ships, and submarines. MMM addresses requirements of automated operational/shipboard Medical Departments to store, process, and retrieve data; to monitor the medical environment and health of personnel who live and work in the ship/facility; and to contribute to the overall readiness of the operational/shipboard Medical Department. Overall objectives of MMM are to: •Improve medical care of the crew by more efficient resource use. •Support surveillance analysis in operational environments. •Monitor medical support capability onboard ship. •Support management of medical supplies. •Increase efficiency and accuracy of radiation health protection programs. Key Capabilities - MMM is comprised of 5 modules: •Environmental Health (EH) — Assists providers in monitoring selected environmental conditions that may endanger patients' health and ensures corrective action is taken before medical problems arise. Medical personnel use the module to track environmental data. •Health Services (HS) — Used to document, update, report on, and transfer medical information of crew members and visitors. Medical personnel who collect and manage data use the module to track and monitor patient medical readiness information. •System Management (SM) — Allows Program Administrators to maintain facility data and provider information, including access privileges. The module also facilitates management of security features and patient transfers. •TMIP Radiation Health (TMIP-RH) — Tracks radiation exposure data to

System	Description
	preserve and maintain the physical well-being of personnel working near radioactive materials or exposed to ionizing radiation. •Defense Medical Logistics Standard Support (DMLSS) Maritime (DM) — Previously called Medical Materials, this module helps providers identify requisitioning objectives by tracking low quantities per line item, automatically requisitioning these items, and consequently crediting operating funds. The module also records and verifies Authorized Minimum Medical Allowance List/Authorized Dental Allowance List (AMMAL/ADAL) additions, deletions, and shelf-life extensions, and helps to ensure quality assurance program adherence, specifically in regard to medications, immunizing agents, and lab reagents.

Source: Navy Enterprise Resource Planning, "About Navy ERP," http://www.erp.navy.mil/ (accessed 23 April 2014); Naval Supply Systems Command, *One Touch Support OTS User Guide* (Washington, DC: Government Printing Office.2007); Space and Naval Warfare Systems Command, "Products and Services," http://www.public.navy.mil/spawar/Atlantic/ProductsServices/Pages/default.aspx (accessed 23 April 2014).

APPENDIX B

MARINE CORPS LOGISTICS SYSTEMS

This is a list of the Marine Corps logistics systems. Global Combat Support System-Marine Corps (GCSS-MC) is the primary system used by supply, maintenance, and logistics personnel. Web-Storage Retrieval Automated Tracking Integrated System (STRATIS) is a primary system that is only used by the Supply Management Unit (SMU). All other systems (excluding Total Force Structure Management System and Battle Command Support and Sustainment System) are bridge technologies. Bridge technologies "are home-grown systems that were developed within the Marine Corps to meet a specific need; were designed to be used by deployed units; and were evaluated by Marine Corps System Command and selected to be maintained and sustained because they fit within the overall Marine Corps Logistics Chain operational and technical architecture" (Marine Corps Systems Command 2014).

System	**Description**
Global Combat Support System-Marine Corps (GCSS-MC)	GCSS-MC gives the Marines a single point of entry for all requests for products and services, integrating data and providing greater access to near-real-time, accurate information up and down the logistics chain. With greater asset visibility and improved access to timely, reliable information, commanders can make faster, better-informed decisions. Key capabilities include: •Forecasting •Inventory Planning •Demand Planning •Request Management •Maintenance Management •Maintenance Planning •Asset Management •Order Management •Inventory Management •Service Management •Financial Resource Management •Warehouse Management •Purchasing •Reporting
Web-Storage Retrieval Automated Tracking Integrated System (STRATIS)	A web-enabled warehouse management application. This application is only used by the Supply Management Unit (SMU). All other Marine Corps organizations used warehouse management functionality within GCSS-MC. For the SMU only, inventory balances are recorded in GCSS-MC and Web-STRATIS. Interfaces enable transaction flow between Web-STRATIS with GCSS-MC in order to keep inventory records synchronized. Key functions include: •Shipping •Receiving •Inventory Control •Shelf-life Management •Lot Number Management

System	Description
	•Serialized Item Management •Location Management
Transportation Capacity Planning Tool (TCPT)	A net centric/web accessible tool that aids with the planning, tracking, management, and execution of transportation centric missions. TCPT provides transportation and logistics commanders with transportation capacity planning via a digital dashboard view of all available transportation assets, mission requirements, and essential elements of information to aid with executing his current and future transportation missions.
Common Logistics Command and Control (CLC2S)	A combat service support management tool that provides a simple Logistics Command and Control (LogC2) capability. CLC2S provides improved management and control of tactical level resources and services support requirements while providing the MAGTF Commander and his staff with an automated means to quickly view his warfighting readiness posture via the battle space Common Operating Picture (COP).
Total Force Structure Management System (TFSMS)	Total Force Structure Management System (TFSMS) is an enterprise system that combines manpower and equipment data for the purpose of managing the Total Force. The primary mission of TFSMS is to serve as the primary data source and business process engine for the activities defined in Marine Corps Order 5311.1D. TFSMS replaced the following legacy systems: Table of Manpower Requirements (T/MR), Logistics Management Information System (LMIS), Troop List (TL), Manning Level Process (MLP). TFSMS allows the Marine Corps to view and analyze Total Force data from an enterprise view. Key functional items allowed by such an enterprise system include: •A single, fully integrated force structure information system incorporating the capability to concurrently manage structure and equipment data. •The ability to record and retrieve changes made to the data. •A single operational data store to serve as the central repository for all force structure information. •The capability to evaluate past, current, and future structure and equipment positions. •A common dictionary that identifies all data to be included as force structure information. •The ability for data entry to originate with the organization that initiates an action. •Integrated workflow capability to manage change requests. •The ability to reduce the cycle time for processing change requests. •Interoperability with all processes of the Combat Development System. •The ability for owners of source data to populate and manage relevant data sets within the system. •Reengineering of all applicable business processes and rules supporting the total force management process. •The ability to standardize the structure and equipment for like organizations. •The workflow process allows USMC organizations to request changes via on-line electronic forms, then automatically route them through pre-designated approval chains up to TFSD. The workflow module tracks and supports queries regarding status and progress on all pending change requests.

System	Description
	•A configuration management capability allows for reviews of any changes made to Force Structure. •Through automated and ad hoc reporting capabilities, TFSMS can support queries or data interfaces to other USMC organizations and operational systems with respect to past, present, or future Force Structure initiatives.
Battle Command Support and Sustainment System (BCS3)	A map-centric display on a commercial laptop that provides a technical and visual picture of the battlefield. BCS3 allows In-Transit Visibility (ITV) to be graphically displayed on the COP accessible across the entire supply chain in order to enhance decision-making abilities and better support operationally-deployed units.
Warehouse-to-Warfighter (W2W)	An Radio Frequency Identification (RFID) concept that attaches active, battery-powered RFID tags to materiel so that it can be tracked as it moves through the supply system to the consignee in theater. Automatic visibility of shipments throughout the retail supply chain is ensured by portable deployment kits and set-up checkpoints at each major camp at the battalion level.
Marine Corps Equipment Readiness Information Tool (MERIT)	A web-based program that uses a specialized graphical user interface to transform the legacy data into information which can be used to analyze trends and identify emerging challenges in order to provide a dynamic, adaptable view of equipment readiness for the Marine Corps.

Source: Department of Defense *Global Combat Support System – Marine Corps / Logistics Chain Management (GCSS-MC/LCM)* (Washington, DC: Government Printing Office 2005); Marine Corps Systems Command, "Bridge Technologies," http://www.marcorsyscom.usmc.mil/sites/gcss-mc/index.aspx/fsbridge (accessed 24 April 2014).; United States Marine Corps, "Total Force Structure Management System (TFSMS)," https://tfsms.mccdc.usmc.mil/portal/page/portal/TFSMS/WELCOME (accessed 24 April 2014); United States Marine Corps, "Global Combat Support System-Marine Corps (GCSS-MC)," https://gcssmc-sso.csd.disa.mil/ (accessed 24 April 2014).

APPENDIX C

DEFENSE LOGISTICS MANAGEMENT STANDARDS (DLMS) TRANSACTIONS

This is a comprehensive list of DLMS transactions available for use. The transaction set contains the format and data contents for a given set of transactions. The title provides a description of the transaction set. The document identifiers are the types of transactions in a given transaction set (e.g., requisition, receipt, and etc.). The column "Marine Corps Use" indicates transaction sets that the Marine Corps has fully implemented, partially implemented, or not implemented. Not all transaction sets or transactions are required for implementation.

Transaction Set	**Title**	**Document Identifiers**	**Marine Corps Use**
140A	Small Arms & Light Weapons (SA/LW) Reporting	DSC, DSD, DSF, DSM, DSR	
180M	Materiel Returns Reporting	FTA, FTC, FTF, FTE/FTG, FTT	Partial
511M	Requisition Modification	A0_/AM_, AMF/AMP	Partial
511R	Requisition	A0_/AM_, A02/A0B, A3_, A4_	Partial
517G	Government Furnished Materiel (GFM) Validation	AX1, AX2	
517M	Materiel Obligation Validation (MOV)	AN_, AN9/ANZ, AP9/APX, AP_, APR, AP8, AV_	Partial
527D	Due-in/Advance Receipt /Due Verification	DD_, DF_, DLC, DLD, DLE, DLF, DU_, DW_	
527R	Receipt, Inquiry, Response and MRA	D4_, D6_, DRA/DRB, DRF, DXA, DXB, DXC, DXD, DZK	Partial
536L	Logistics Reassignment Management Data	DLS, DLT, DLU, DLV, DLW, DLX	
567C	Contract Completion Status (DLMS Contract Completion Statement/Unclosed Contract Status/Contract Close-out Extension)	PK9/PK9, PKX/PKX, PKZ/PKZ	
650A	Assembly Component Maintenance Structure	C2A/C2B/C2D	
650C	Component Packing Confirmation	C2F	

Transaction Set	Title	Document Identifiers	Marine Corps Use
810L	Logistics Bill	FA1/GA1, FA2/GA2, FB1/GB1, FB2/GB2, FC1/GC1, FC2/GC2, FD1/GD1, FD2/GD2, FE3/GE3, FE4/GE4, FF1/GF1, FF2/GF2, FG1/GG1, FG2/GG2, FJ1/GJ1, FJ2/GJ2, FL1/GL1, FL2/GL2, FN1/GN1, FN2/GN2, FP1/GP1, FP2/GP2, FQ1/GQ1, FQ2/GQ2, FR1/GR1, FR2/GR2, FS1/GS1, FS2/GS2, FU1/GU1, FU2/GU2, FW1/GW1, FW2/GW2, FX1/GX1, FX2/GX2	
812L	Logistics Bill Adjustment Request Reply	FAR, FAS, FDR, FDS, FJE, FJF, FJR, FJS, FTB, FTP, QB1	Partial
812R	Logistics Bill Adjustment Request	FAE, FAF, FDE, FDF, FTP	Partial
824R	Reject Advice	DZG	
830D	Demand Data Exchange (DDE) Projected Supply Plan		
830R	Special Program Requirements	DYA/DYB, DYL/DYM, DYC, DYD, DYG, DYH, DYJ	
830W	War Materiel Requirements	DMA, DMB, DMC, DMD, DME	

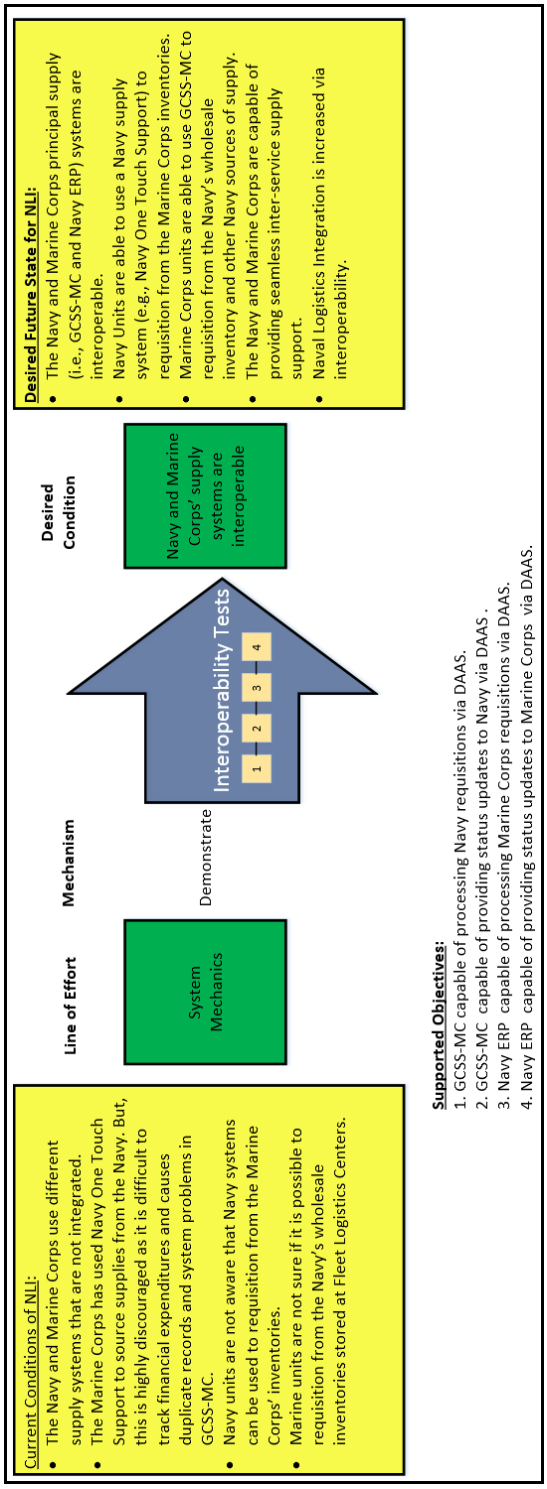
Transaction Set	Title	Document Identifiers	Marine Corps Use
832N	Catalog Data Support		
842A/R	Standard Supply Discrepancy Report (SDR) Reply	SF 364	
842A/W	Standard Supply Discrepancy Report (SDR), Follow-up, Correction, Cancellation, & Reconsideration Request	SF 364	
842C/I	Stock Screening Request		
842C/R	Stock Screening Reply		
842P	Product Quality Deficiency Report (PQDR) Data Exchange		
842S/Q	Storage Quality Control Report	DD 1225	
842S/R	Storage Quality Control Report (SQCR) Reply	DD 1225	
846A	Asset Reclassification		
846C	Disposition Category Update		
846D	Logistics Reassignment Transfer and Decapitalization	DEE, DEF, DLA	
846F	Ammunition Freeze/Unfreeze	DA1, DA2	
846I	Asset Status Inquiry/ Report	DZA, DZE, DZF, BSS, BZE	
846L	Logistic Asset Support Estimate (LASE)		
846M	Supply Support Request Information	CWA, CX_	
846O	Supply Support Output Information		
846P	Physical Inventory Request	DJA, DZJ, DZM	
846R	Location Reconciliation Request	DZH, DZN, DZP	
846S	Logistics Reassignment Storage Transfer/ Order/Reply	DZC, DZD	
856	Advance Shipment Notice (ASN)	PJJ/PJR/PK5	
856N	Notice of Availability	AD1, AD2, AD3, AD4, ADR	
856R	Shipment Status Materiel Returns	FTM	Full
856S	Shipment Status	AS1-6, AS8, ASY, AU_, AU1-5, AU7-8	Partial
857	Shipment and Billing Notice		
861	Acceptance Report	PKN, PKP	
867D	Demand Reporting	DHA, BHJ	
867I	Issue	D7_	
869A	Requisition Inquiry/Supply Assistance Request	AF_, AFT	Partial

Transaction Set	Title	Document Identifiers	Marine Corps Use
869C	Requisition Cancellation	AC_, AK_, ACM/ACP, AD1	Partial
869F	Requisition Follow-Up	AT_	Partial
870L	Special Program Requirement (SPR) / Logistics Asset Support Estimate (LASE) Notification	DYK, DZ9	
870M	Materiel Returns Supply Status	FT6, FTD, FTL, FTR, FTQ, FTZ	Partial
870N	Notice of Availability Reply	AD5	
870S	Supply Status	AE_, AB_	Partial
888A	Small Arms & Light Weapons (SA/LW) Data Change	DSA, DSB	
888I	Storage Item Correction	DZB	
888W	Weapon Systems Data Change	WS1, WS3	
940R	Materiel Release	AFX/AFZ, AC6/AC7, AF6, A5J/AFJ, ACJ/AKJ, ARH, A2_, A4_, A5_	
940S	Materiel Staging Request		
943A	Warehouse Service Advice		
945A	Materiel Release Advice	AE6, AG6, ARA, ARB, AR0, AUA, AUB, AU0, ARJ, ARK, ARL, AEJ, A6_, A6J, ASH, ASZ	
947I	Inventory Adjustment	D8_, D9_, D8E, D8F, D9E, D9F, D8S, D9S, DAC, DAD, DAS	
996H	Hazardous Materiel/Hazardous Waste Profile		
997	Functional Acknowledgement		

Source: Defense Logistics Agency, "DLMS Implementation Conventions - Transaction Sets," http://www2.dla.mil/j-6/dlmso/elibrary/TransFormats/140_997.asp (accessed 24 April 2014); Department of the Navy, "GCSS-MC/LCM Block 1 IF-065_I-032 IF.065 Interface Functional and Technical Design and Unit Test: I-032 DAAS Purchase Order Outbound Interface," "GCSS-MC/LCM Block 1 IF-065_I-041, IF.065 Interface Functional and Technical Design and Unit Test: I-041 DAAS Outbound Inbound Interface," "GCSS-MC/LCM Block 1 IF-065_I-125, IF.065 Interface Functional and Technical Design and Unit Test: I-125 DAAS ASN/Status/PO Inbound Interface" (Programs created by Oracle Consulting, 2009).

APPENDIX D

PROBLEM-SOLVING APPROACH

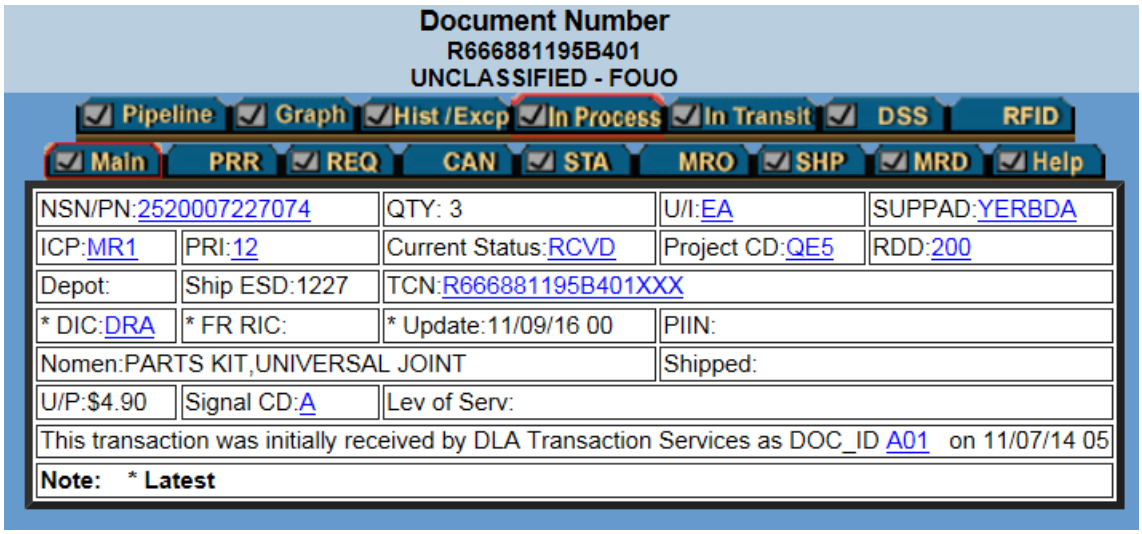


Source: Created by author.
This problem solving approach describes how interoperability tests between the Navy and Marine Corps ground supply systems could lead to increased Naval Logistics Integration.

APPENDIX E

GCSS-MC, NAVY OTS, AND DAAS INTEROPERABILITY TEST SCREENSHOTS

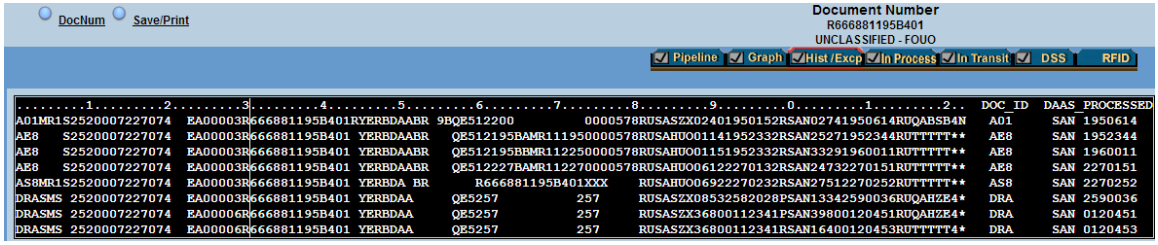
The following is a screenshot from Web Visual Logistics Information Processing System (WEBVLIPS) that provides the latest status of the test requisition.[24] On 14 July 2011, Defense Logistics Agency (DLA) Transaction Services received a requisition from the Naval Mobile Construction Battalion (NMCB) for three "Parts Kit, Universal Joint." NMCB is identified by the Department of Defense Activity Address Code (DODAAC) of "R66688" in the Document Number. On 16 September 2011, NMCB received the requested items. This is evident by the Document Identifier Code (DIC) of "DRA," which translates to Material Receipt Acknowledgement (MRA).



Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

[24]WEBVLIPS is "a web based, access controlled query system. It accesses the Logistics On-line Tracking System (LOTS), a Transaction Services relational database system, which portrays the life cycle of a logistics action. The WEBVLIPS customer can track requisitions from their release into the DOD pipeline, until the materiel is posted to the accountable records at the destination activity" (Defense Logistics Agency 2014f). WEBVLIPS provides the capability to research and track transactions processed by DAAS.

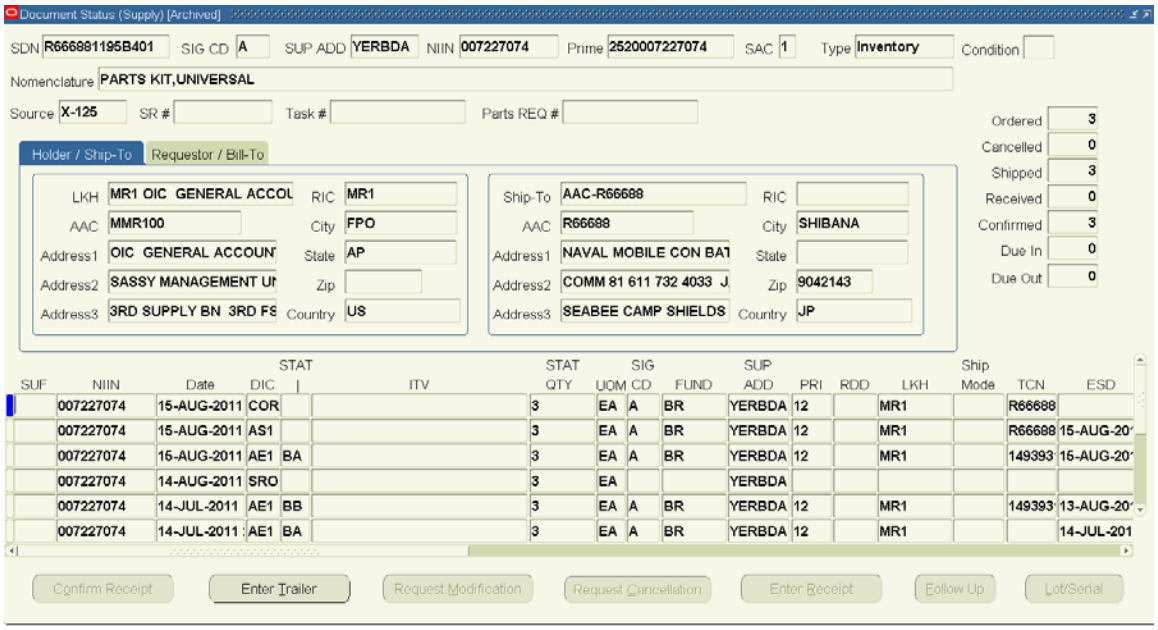
The following is a screenshot from WEBVLIPS that provides the chronological order of transactions for the test requisition. The transactions are sorted from oldest to newest with the oldest record at the top. The first transaction is a requisition from the NMCB to 3rd Supply Battalion's Supply Management Unit (SMU) for three "Parts Kit, Universal Joint." The next three transactions are status updates from the SMU to the NMCB. The fifth transaction is a shipment status update from the SMU to the NMCB. The last three transactions MRAs from the NMCB to the SMU.



..1..2..3..4..5..6..7..8..9..0..1..2..	DOC_ID	DAAS_PROCESSED
A01MR1S2520007227074 EA00003R666881195B401RYERBDAABR 9BQE512200 0000578RUSASZX02401950152RSAN02741950614RUQABSB4N	A01	SAN 1950614
AE8 S2520007227074 EA00003R666881195B401 YERBDAABR QE512195BAMR11195000578RUSAHUO0114195233 2RSAN25271952344RUTTTTT**	AE8	SAN 1952344
AE8 S2520007227074 EA00003R666881195B401 YERBDAABR QE512195BBMR11225000578RUSAHUO0115195233 2RSAN33291960011RUTTTTT**	AE8	SAN 1960011
AE8 S2520007227074 EA00003R666881195B401 YERBDAABR QE512227BAMR11227000578RUSAHUO0612227013 2RSAN24732270151RUTTTTT**	AE8	SAN 2270151
AS8MR1S2520007227074 EA00003R666881195B401 YERBDA BR R666881195B401XXX RUSAHUO0692227023 2RSAN27512270252RUTTTTT**	AS8	SAN 2270252
DRASMS 2520007227074 EA00003R666881195B401 YERBDAA QE5257 257 RUSASZX08532582028PSAN13342590036RUQAHZE4*	DRA	SAN 2590036
DRASMS 2520007227074 EA00006R666881195B401 YERBDAA QE5257 257 RUSASZX36800112341PSAN39800120451RUQAHZE4*	DRA	SAN 0120451
DRASMS 2520007227074 EA00006R666881195B401 YERBDAA QE5257 257 RUSASZX36800112341RSAN16400120453RUTTTTT4*	DRA	SAN 0120453

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from Global Combat Support System-Marine Corps' (GCSS-MC) Document Management form that provides the chronological order of transactions for the test requisition. The top of the form shows basic information about the item. The middle section provides basic information about the requestor and the supporting organization. The bottom section lists all of the transactions received from DAAS. The transactions are sorted from newest to oldest with the newest record at the top. Although not visible, the first transaction is a requisition from the NMCB to 3rd Supply Battalion's Supply Management Unit (SMU) for three "Parts Kit, Universal Joint." The remaining transactions are status updates that were sent from the SMU to the NMCB via DAAS.

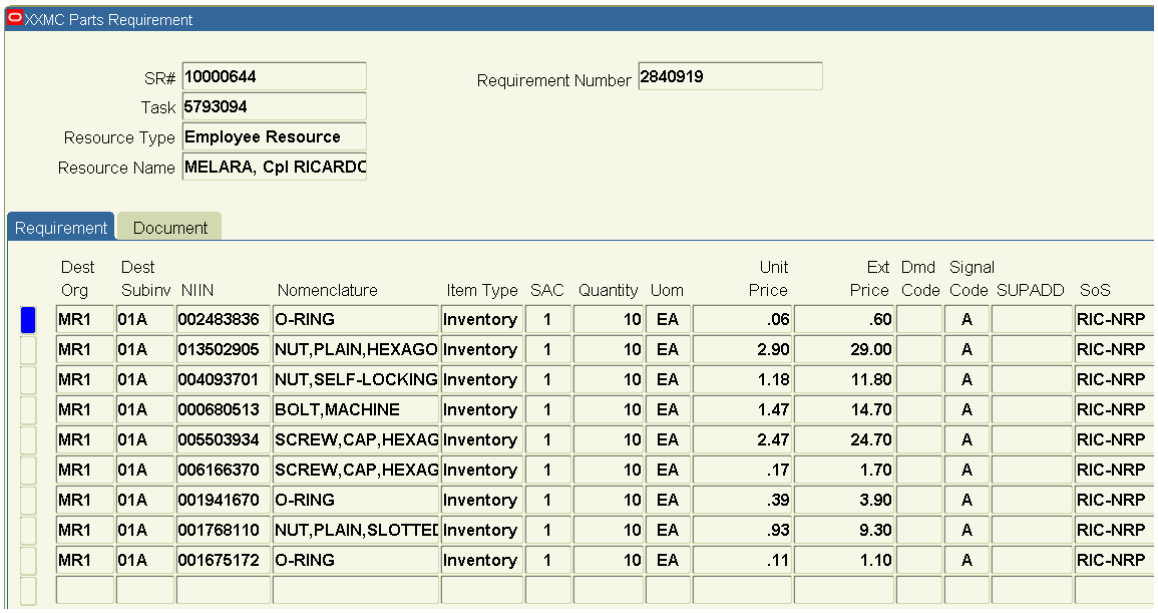


Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

APPENDIX F

GCSS-MC, NAVY ERP, AND DAAS INTEROPERABILITY TEST SCREENSHOTS

The following is a screenshot of the Global Combat Support System-Marine Corps' (GCSS-MC) Parts Requirement form that 3rd Supply Battalion's Supply Management Unit (SMU) used to create the test requisitions. In the far right column on the lower section, the Source of Supply (SoS) specifies "RIC-NRP," which translates to Naval Supply Systems Command (NAVSUP). Before the sourcing rules were modified, this field reflected "RIC-SMS" as the Defense Logistics Agency (DLA) is the primary SoS for these items. However, after the sourcing rules were modified to reflect NAVSUP, the field SoS listed "RIC-NRP" instead of "RIC-SMS."



XXMC Parts Requirement

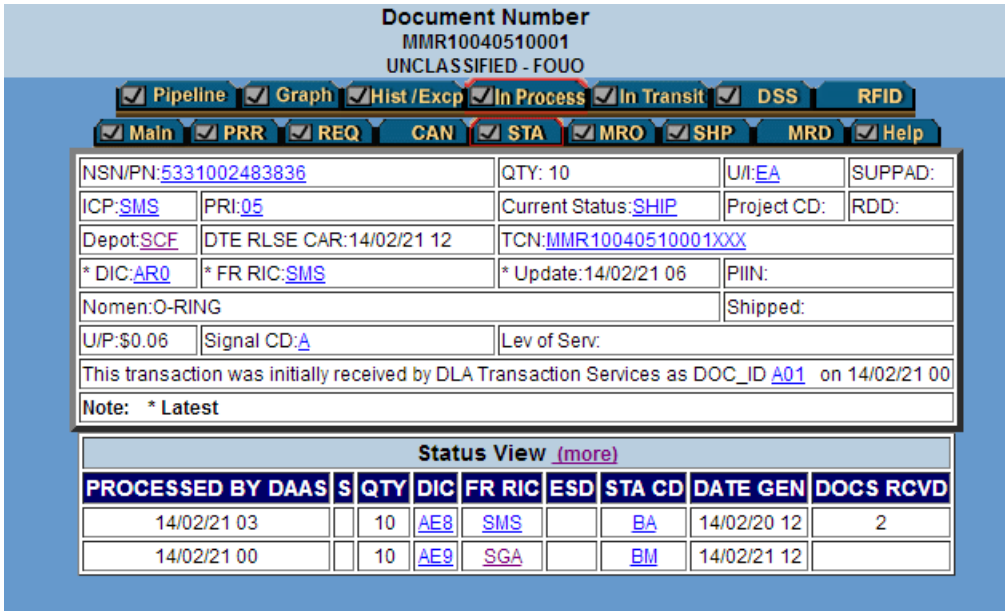
SR# 10000644 Requirement Number 2840919
Task 5793094
Resource Type Employee Resource
Resource Name MELARA, Cpl RICARDC

Requirement | Document

	Dest Org	Dest Subinv	NIIN	Nomenclature	Item Type	SAC	Quantity	Uom	Unit Price	Ext Price	Dmd Code	Signal Code	SUPADD	SoS
	MR1	01A	002483836	O-RING	Inventory	1	10	EA	.06	.60		A		RIC-NRP
	MR1	01A	013502905	NUT,PLAIN,HEXAGO	Inventory	1	10	EA	2.90	29.00		A		RIC-NRP
	MR1	01A	004093701	NUT,SELF-LOCKING	Inventory	1	10	EA	1.18	11.80		A		RIC-NRP
	MR1	01A	000680513	BOLT,MACHINE	Inventory	1	10	EA	1.47	14.70		A		RIC-NRP
	MR1	01A	005503934	SCREW,CAP,HEXAG	Inventory	1	10	EA	2.47	24.70		A		RIC-NRP
	MR1	01A	006166370	SCREW,CAP,HEXAG	Inventory	1	10	EA	.17	1.70		A		RIC-NRP
	MR1	01A	001941670	O-RING	Inventory	1	10	EA	.39	3.90		A		RIC-NRP
	MR1	01A	001768110	NUT,PLAIN,SLOTTEI	Inventory	1	10	EA	.93	9.30		A		RIC-NRP
	MR1	01A	001675172	O-RING	Inventory	1	10	EA	.11	1.10		A		RIC-NRP

Source: United States Marine Corps, "Global Combat Support System-Marine Corps (GCSS-MC)," https://gcssmc-sso.csd.disa.mil/ (accessed 24 April 2014)..

The following is a screenshot from Web Visual Logistics Information Processing System (WEBVLIPS) that provides the latest status of the test requisition. On 21 February 2014, Defense Logistics Agency (DLA) Transaction Services received a requisition from 3rd Supply Battalion's Supply Management Unit (SMU) for ten "O-Ring." The SMU is identified by the Department of Defense Activity Address Code (DODAAC) of "MMR100" in Document Number "MMR10040510001." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Yokosuka, Japan (DDYJ) for fulfillment (i.e., Depot SCF). DDYJ shipped the items the same day.



Document Number
MMR10040510001
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID
Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

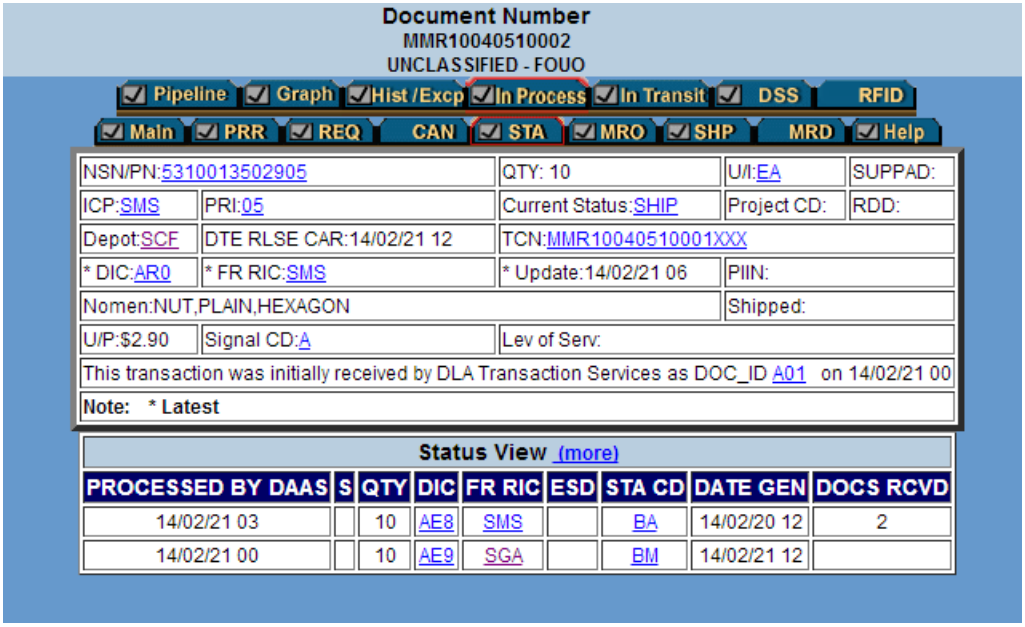
NSN/PN:5331002483836		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:SCF	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510001XXX		
* DIC:AR0	* FR RIC:SMS	* Update:14/02/21 06	PIIN:	
Nomen:O-RING			Shipped:	
U/P:$0.06	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Nut, Plain, Hexagon." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510002." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DDYJ for fulfillment (i.e., Depot SCF). DDYJ shipped the items the same day.



Document Number
MMR10040510002
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

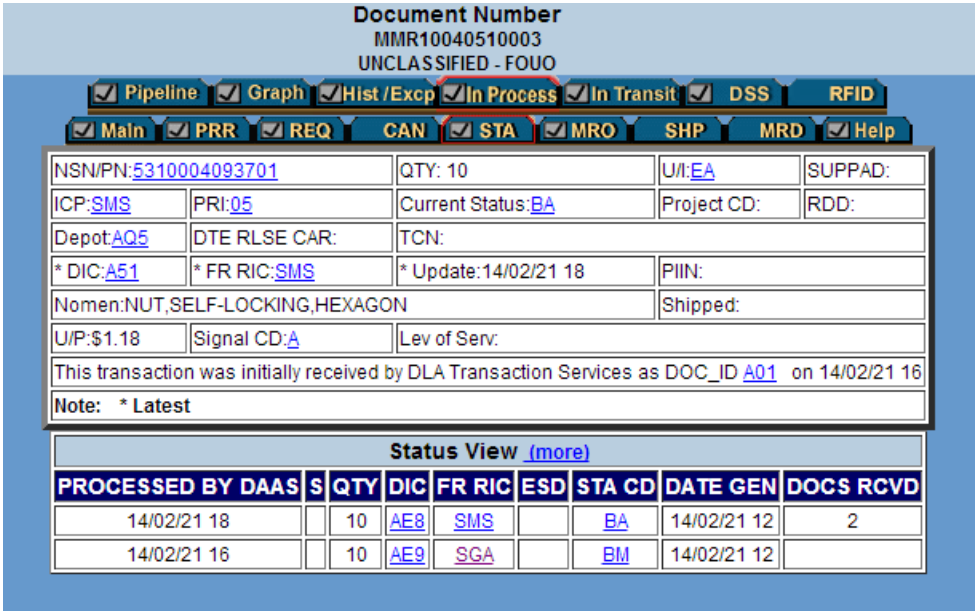
NSN/PN:5310013502905		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:SCF	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510001XXX		
* DIC:AR0	* FR RIC:SMS	* Update:14/02/21 06	PIIN:	
Nomen:NUT,PLAIN,HEXAGON			Shipped:	
U/P:$2.90	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Nut, Self-Locking, Hexagon." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510003." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Tracy, California for fulfillment (i.e., Depot AQ5).



Document Number
MMR10040510003
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

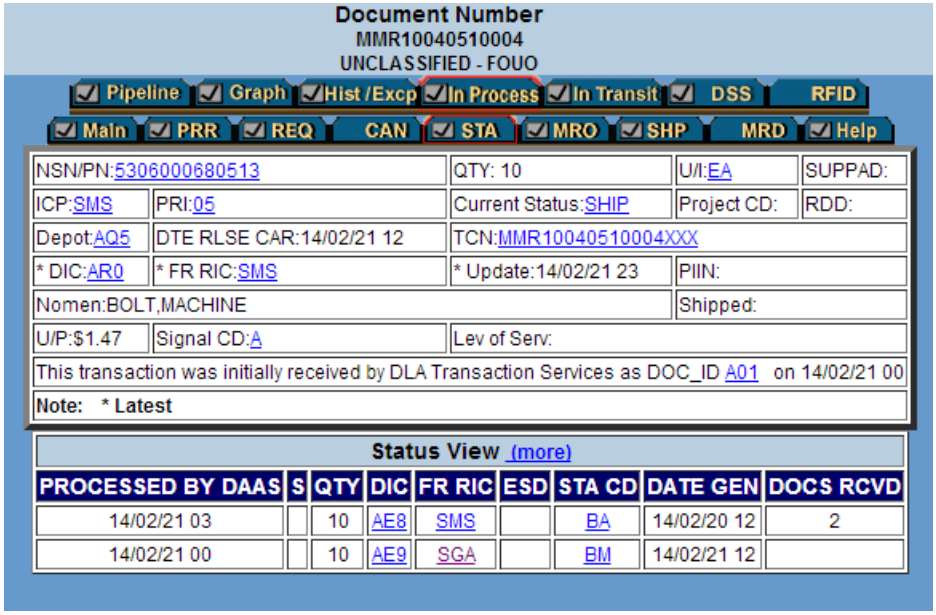
NSN/PN:5310004093701		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:BA	Project CD:	RDD:
Depot:AQ5	DTE RLSE CAR:	TCN:		
* DIC:A51	* FR RIC:SMS	* Update:14/02/21 18	PIIN:	
Nomen:NUT,SELF-LOCKING,HEXAGON			Shipped:	
U/P:$1.18	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 16				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 18		10	AE8	SMS		BA	14/02/21 12	2
14/02/21 16		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Bolt, Machine." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510004." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Tracy, California for fulfillment (i.e., Depot AQ5). The items were shipped the same day.



Document Number
MMR10040510004
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

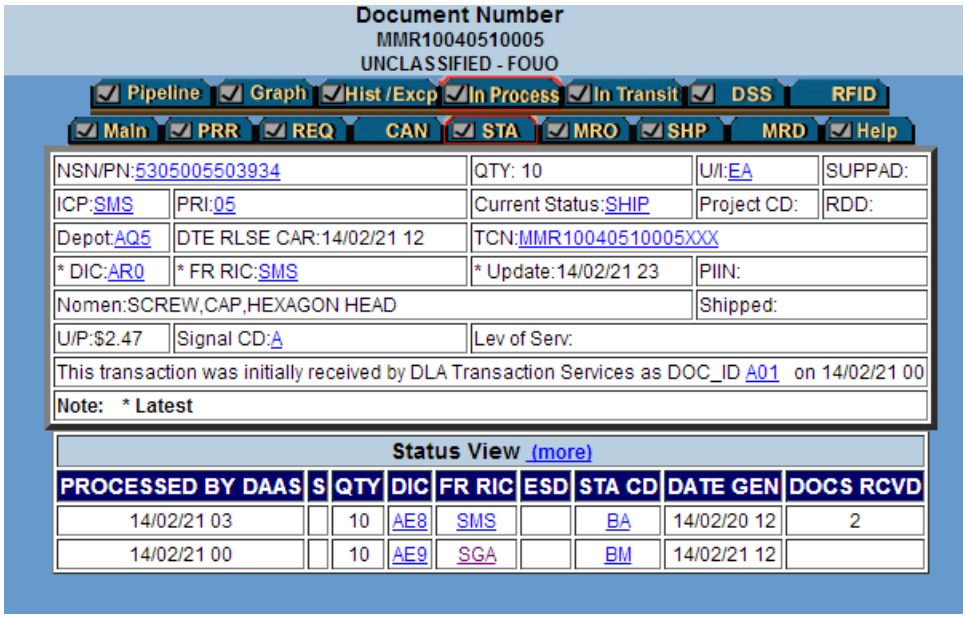
NSN/PN:5306000680513		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:AQ5	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510004XXX		
* DIC:AR0	* FR RIC:SMS	* Update:14/02/21 23	PIIN:	
Nomen:BOLT,MACHINE			Shipped:	
U/P:$1.47	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Screw, Cap, Hexagon Head." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510005." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Tracy, California for fulfillment (i.e., Depot AQ5). The items were shipped the same day.



Document Number
MMR10040510005
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

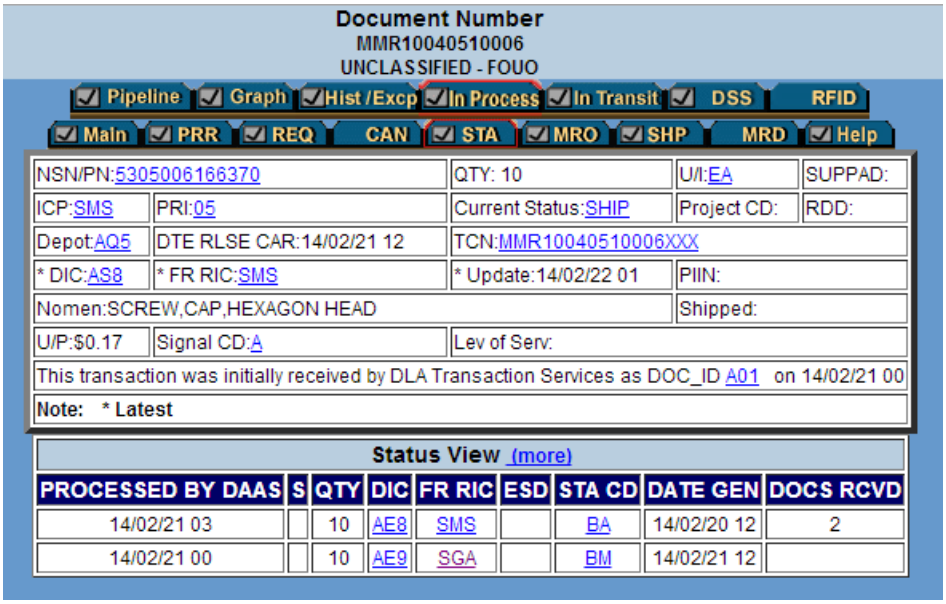
NSN/PN:5305005503934		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:AQ5	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510005XXX		
* DIC:AR0	* FR RIC:SMS	* Update:14/02/21 23	PIIN:	
Nomen:SCREW,CAP,HEXAGON HEAD			Shipped:	
U/P:$2.47	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Screw, Cap, Hexagon Head." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510006." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Tracy, California for fulfillment (i.e., Depot AQ5). The items were shipped the same day.



Document Number
MMR10040510006
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

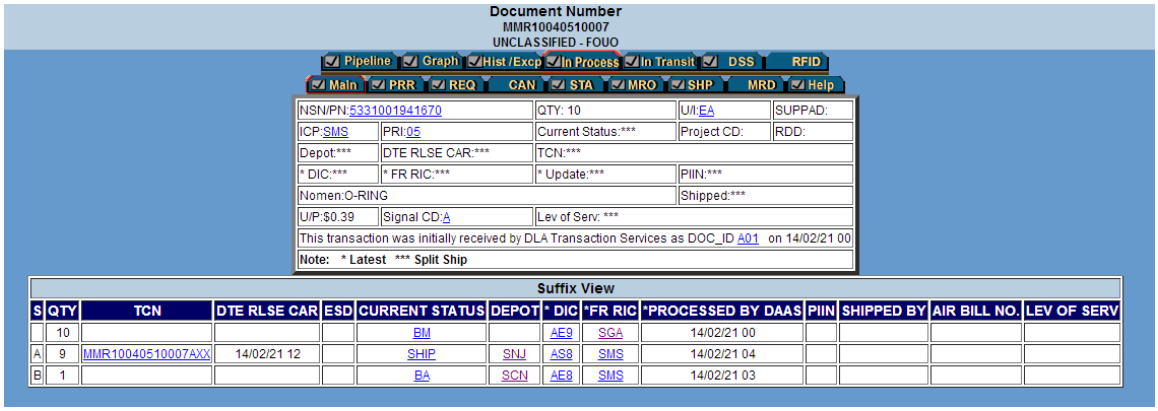
NSN/PN:5305006166370		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:AQ5	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510006XXX		
* DIC:AS8	* FR RIC:SMS	* Update:14/02/22 01	PIIN:	
Nomen:SCREW,CAP,HEXAGON HEAD			Shipped:	
U/P:$0.17	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "O-Ring." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510007." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released part of the requisition to DLA Distribution Depot Guam, Marinas (DDGM) for fulfillment (i.e., Depot SCN). The remaining part of the requisition was released to DLA Distribution Depot Okinawa, Japan (DDYG) for fulfillment (i.e., Depot SNJ).



Document Number
MMR10040510007
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

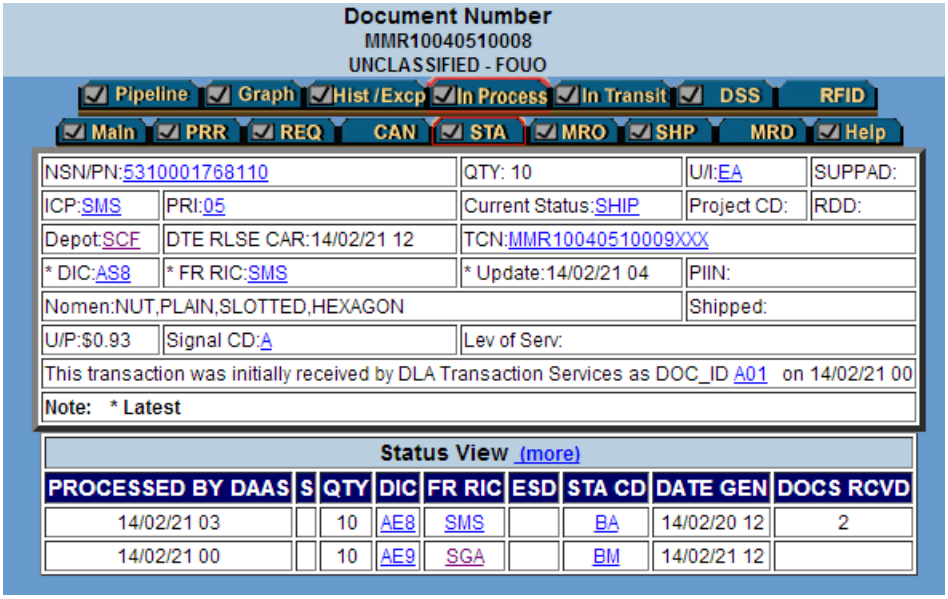
NSN/PN:5331001941670		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:***	Project CD:	RDD:
Depot:***	DTE RLSE CAR:***	TCN:***		
* DIC:***	* FR RIC:***	* Update:***	PIIN:***	
Nomen:O-RING			Shipped:***	
U/P:$0.39	Signal CD:A	Lev of Serv: ***		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest *** Split Ship				

Suffix View

S	QTY	TCN	DTE RLSE CAR	ESD	CURRENT STATUS	DEPOT	* DIC	*FR RIC	*PROCESSED BY DAAS	PIIN	SHIPPED BY	AIR BILL NO.	LEV OF SERV
	10				BM		AE9	SGA	14/02/21 00				
A	9	MMR10040510007AXX	14/02/21 12		SHIP	SNJ	AS8	SMS	14/02/21 04				
B	1				BA	SCN	AE8	SMS	14/02/21 03				

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "Nut, Plain, Slotted, Hexagon." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510008." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Yokosuka, Japan (DDYJ) for fulfillment (i.e., Depot SCF). DDYJ shipped the items the same day.



Document Number
MMR10040510008
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

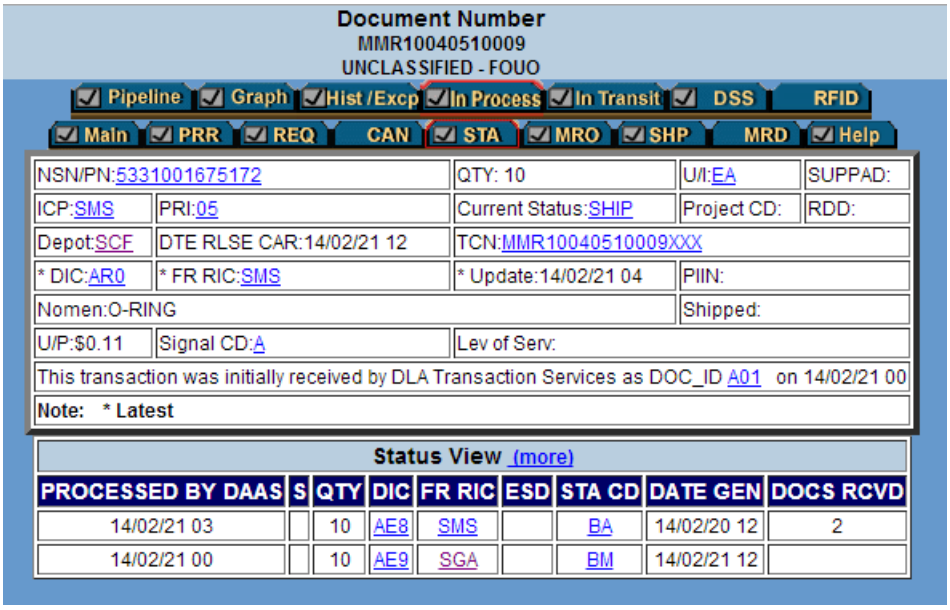
NSN/PN:5310001768110		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:SCF	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510009XXX		
* DIC:AS8	* FR RIC:SMS	* Update:14/02/21 04	PIIN:	
Nomen:NUT,PLAIN,SLOTTED,HEXAGON			Shipped:	
U/P:$0.93	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

The following is a screenshot from WEBVLIPS that provides the latest status of the test requisition. On 21 February 2014, DLA Transaction Services received a requisition from 3rd Supply Battalion's SMU for ten "O-Ring." The SMU is identified by the DODAAC of "MMR100" in Document Number "MMR10040510009." Subsequently, DLA Transaction Services modified the requisition and routed it to DLA (i.e., SMS). DLA released the requisition to DLA Distribution Depot Yokosuka, Japan (DDYJ) for fulfillment (i.e., Depot SCF). DDYJ shipped the items the same day.



Document Number
MMR10040510009
UNCLASSIFIED - FOUO

Pipeline | Graph | Hist /Excp | In Process | In Transit | DSS | RFID

Main | PRR | REQ | CAN | STA | MRO | SHP | MRD | Help

NSN/PN:5331001675172		QTY: 10	U/I:EA	SUPPAD:
ICP:SMS	PRI:05	Current Status:SHIP	Project CD:	RDD:
Depot:SCF	DTE RLSE CAR:14/02/21 12	TCN:MMR10040510009XXX		
* DIC:AR0	* FR RIC:SMS	* Update:14/02/21 04	PIIN:	
Nomen:O-RING			Shipped:	
U/P:$0.11	Signal CD:A	Lev of Serv:		
This transaction was initially received by DLA Transaction Services as DOC_ID A01 on 14/02/21 00				
Note: * Latest				

Status View (more)

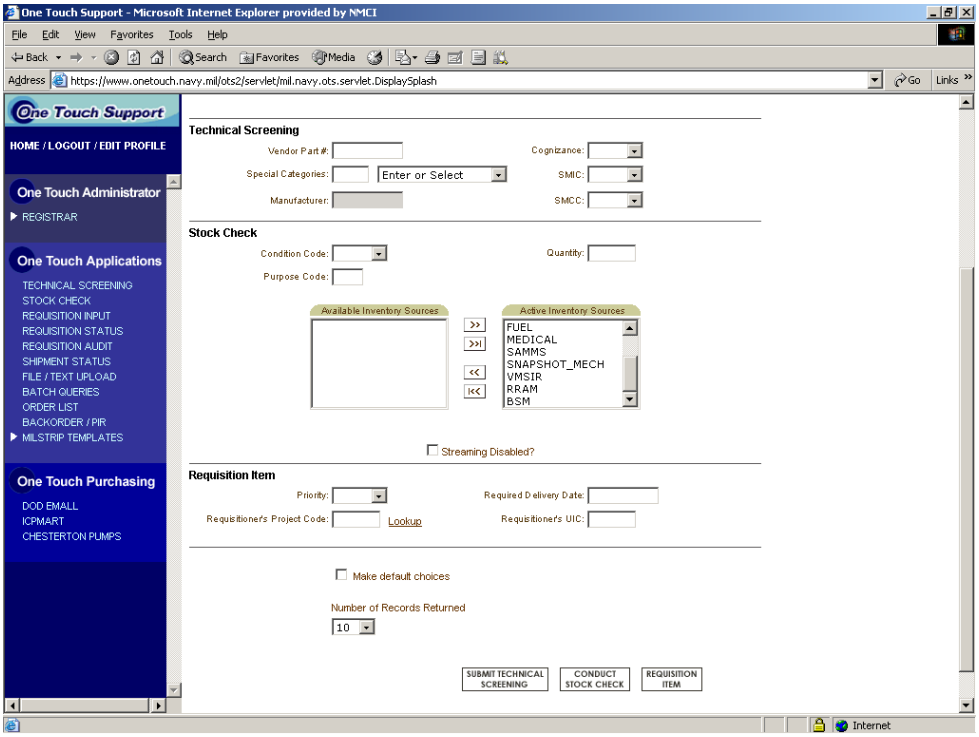
PROCESSED BY DAAS	S	QTY	DIC	FR RIC	ESD	STA CD	DATE GEN	DOCS RCVD
14/02/21 03		10	AE8	SMS		BA	14/02/20 12	2
14/02/21 00		10	AE9	SGA		BM	14/02/21 12	

Source: Defense Logistics Agency, "WEBVLIPS," https://www2.transactionservices.dla.mil/webvlips/ (accessed 30 April 2014).

APPENDIX G

NAVY ONE TOUCH SUPPORT STOCK CHECK SCREENSHOTS

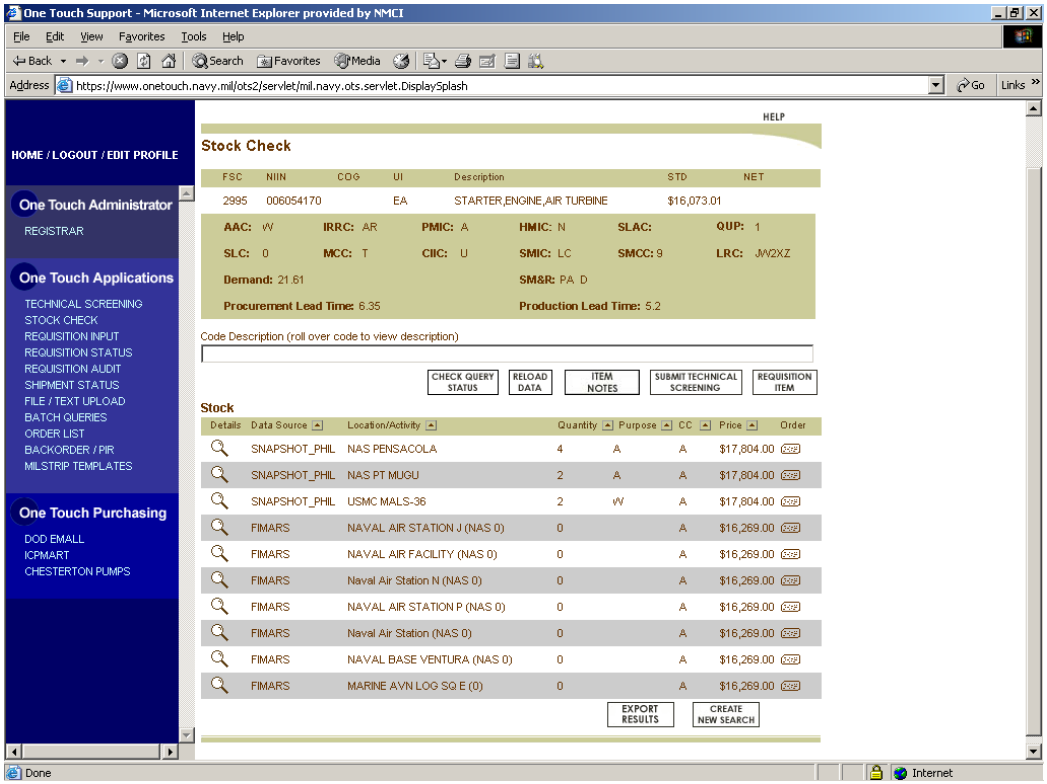
Users can search select data sources for available inventory based upon an item's National Stock Number (NSN) or National Item Identification Number (NIIN). Users can also filter the search results based upon the item's condition, purpose, and quantity.[25] "Data sources include SNAPSHOT or Uniform Inventory Control Point (UICP), Uniform Automated Data Processing System (UADPS), Virtual Master Stock Inventory Record (VMSIR), Defense Reutilization and Marketing Service (DRMS), Force Inventory Management Analysis Reporting System (FIMARS), Standard Automated Material Management System (SAMMS), Real-time Reutilization Asset Management (RRAM), and Business System Modernization (BSM)" (Naval Supply Systems Command 2007).



Source: Naval Supply Systems Command, *One Touch Support OTS User Guide* (Washington, DC: Government Printing Office, 2007). This is a screenshot of Navy One Touch Support's (OTS) "Stock Check Advanced Search Criteria Screen."

[25]Condition codes "segment and identify, on the inventory control record, the physical state of the materiel or actions underway to change the status of the materiel" (Department of Defense 2012d, C2-3 - C2-4). Purpose codes "segment and identify, on the inventory control record maintained by the owner, the purpose or reservation for which the materiel is held" (Department of Defense 2012d, C2-3).

The top section provides characteristics about the item searched. The bottom section lists available inventory balances to include the data source recording the inventory balance, the location of the items, the item's condition, the item's purpose, and the item's cost. Based upon the search results, users have the ability to requisition an item from a particular source of supply. Once the requisition is created, the requisition is sent to the Defense Automated Addressing System (DAAS) for subsequent routing to the specified source of supply.



Source: Naval Supply Systems Command, *One Touch Support OTS User Guide* (Washington, DC: Government Printing Office, 2007). This is a screenshot of Navy One Touch Support's (OTS) "Stock Check Results Screen."

APPENDIX H

MILSTRIP URGENCY OF NEED DESIGNATORS

This table includes the Military Standard Requisitioning and Issue Procedure (MILSTRIP) Priority Designators, Force/Activity Designators (F/AD), and the Urgency of Need Designators (UND) (Defense Logistics Agency 2009). The F/AD expresses a unit's relative mission essentiality. The UND expresses the urgency of need for an item for the end use. An UND of "A" translates to a high priority item. An UND of "B" translates to a medium priority item. An UND of "C" translates to a routine item. On a requisition, the F/AD and UND is expressed with a Priority Designator. For example, a priority designator of "12" indicates that a F/AD II is requesting an item with an UND of "C". If the unit is located overseas, then the unit can expect the item between 37 to 71 days depending on the units geographic location. If the unit is located within the Continental United States, then the unit can expect the item within 14 days. If a special Required Delivery Date (RDD) is used, then the requisition will be expedited and incur additional transportation costs.

	Urgency of Need Designator		
Force/Activity Designator	**A**	**B**	**C**
I	PRIORITY DESIGNATOR 1 Conus: 4 Days Overseas: 12 - 14 Days Express*: 6.5 Days	PRIORITY DESIGNATOR 4 Special RDD Entry** Conus: 7 Days Overseas: 17 - 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	PRIORITY DESIGNATOR 11 Special RDD Entry*** Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days
II	PRIORITY DESIGNATOR 2 Conus: 4 Days Overseas: 12 - 14 Days Express*: 6.5 Days	PRIORITY DESIGNATOR 5 Special RDD Entry** Conus: 7 Days Overseas: 17 - 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	PRIORITY DESIGNATOR 12 Special RDD Entry*** Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days
III	PRIORITY DESIGNATOR 3 Conus: 4 Days Overseas: 12 - 14 Days Express*: 6.5 Days	PRIORITY DESIGNATOR 6 Special RDD Entry** Conus: 7 Days Overseas: 17 - 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	PRIORITY DESIGNATOR 13 Special RDD Entry*** Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days
IV	PRIORITY DESIGNATOR 7 Special RDD Entry**	PRIORITY DESIGNATOR 9 Special RDD Entry***	PRIORITY DESIGNATOR 14 Special RDD Entry***

	Urgency of Need Designator		
Force/Activity Designator	**A**	**B**	**C**
	Conus: 7 Days Overseas: 17 - 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days
V	PRIORITY DESIGNATOR 8 Special RDD Entry** Conus: 7 Days Overseas: 17 - 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	PRIORITY DESIGNATOR 10 Special RDD Entry*** Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days	PRIORITY DESIGNATOR 15 Special RDD Entry*** Conus: 7 Days Overseas: 17 – 19 Days Other RDDS: Conus: 14 Days Overseas: 37 – 71 Days

Time includes requisition submission time and receipt take-up time.

*Applies to Overseas Issue Priority Group (IPG I) < 150 lbs with or RDD of 999, 777, N or E.

**Applies to Expedite Handling RDDs of N, E, 777, 555, 444 or J < 8 days.

***Applies to Expedite Handling RDDs of 555, 444 or JD < 8 days.

Source: Defense Logistics Agency, *Customer Assistance Handbook*, 17th ed. (Fort Belvoir, VA: Defense Logistics Agency, 2009).

APPENDIX I

DEFENSE LOGISTICS AGENCY'S TIME DEFINITE DELIVERY STANDARDS

Below are Defense Logistics Agency's (DLA) Time Definite Delivery standards for shipments. Time Definite Delivery Standards fall into one of three categories that indicate that a given requisition is for high priority items, medium priority items, or routine items. Within each category, there are different standards depending on the area (i.e., geographic location) and whether or not the item is expedited (EXP). There are five geographic areas: (1) within the Continental United States (CONUS) (Alaska and Hawaii are excluded); (2) outside the Continental United States (OCONUS) Area A (in the vicinity of Alaska); (3) OCONUS Area B (in the vicinity of the United Kingdom); (4) OCONUS Area C (in the vicinity of Japan); and (5) OCONUS Area D (hard lift areas).

"Category 1 applies to requisitions with priority designators 01 through 03 and all required delivery dates (RDDs), except when the RDD starts with an "X" or "S" indicating that the materiel is required a number of months in the future" (Defense Logistics Agency 2009).

	AREA					
PIPELINE SEGMENT	**CONUS**	**A**	**B**	**C**	**D**	**EXP**
A. Requisition Submission Time	.5	.5	.5	.5	.5	.5
B. ICP Processing Time	.5	.5	.5	.5	.5	.5
C. Storage Site (or Base) Processing, Packaging and Transportation Hold Time	1	1	1	1	1	1
D. Storage Site to CCP Transportation Time	N/A	1	1	1	1	N/A
E. CCP Processing Time	N/A	.5	.5	.5	1	N/A
F. CONUS In-Transit Time	1.5	1	1	1	1	N/A
G. POE Processing and Hold Time	N/A	3	3	3	3	N/A
H. In-transit to Theater Time	N/A	1	1	1	2.5	3
I. POD Processing Time	N/A	2	2	2	2	N/A
J. In-Transit, Within-Theater time	N/A	1	1	1	1	1
K. Receipt Take-Up Time	.5	.5	.5	.5	.5	.5
Total Order-to-Receipt Time	**4**	**12**	**12**	**12**	**14**	**6.5**

Source: Defense Logistics Agency, "Time Definite Delivery" (PowerPoint Presentation, Defense Logistics Agency, 2007), http://www.powershow.com/view/19a3e-MTVkM/Time_powerpoint_ppt_presentation (accessed 9 May 2014); Defense Logistics Agency, *Customer Assistance Handbook*, 17th ed. (Fort Belvoir, VA: Defense Logistics Agency, 2009).

"Category 2 applies to requisitions with priority designators 04 through 15 and these RDDs:

444. An RDD equal to "444" indicates handling service for customers collocated with the storage activity or for locally negotiated arrangements.

555. An RDD equal to "555" indicates exception to mass requisition cancellation, expedited handling required.

777. An RDD equal to "777" indicates expedited handling required for reasons other than indicated by 444 or 555.

N. An RDD equal to "N__" (where "__" is any alphanumeric character) indicates expedited handling due to NMCS requirement CONUS customer.

E. An RDD equal to "E__" (where "__" is any alphanumeric character) indicates expedited handling due to anticipated NMCS requirement CONUS customer.

Specific Julian Date Less Than or Equal to 8 days for CONUS Customers and 21 days for OCONUS Customers. An RDD equal to a Julian dates that is less than or equal to 8 or 21 (depending on if the customer is CONUS or OCONUS respectively) of the Julian date the requisition or associated shipment is being processed indicates handling to meet the date of delivery."

	AREA					
PIPELINE SEGMENT	**CONUS**	**A**	**B**	**C**	**D**	**EXP**
A. Requisition Submission Time	.5	.5	.5	.5	.5	.5
B. ICP Processing Time	.5	.5	.5	.5	.5	.5
C. Storage Site (or Base) Processing, Packaging and Transportation Hold Time	1	1	1	1	1	1
D. Storage Site to CCP Transportation Time	N/A	3	3	3	3	N/A
E. CCP Processing Time	N/A	1	1	1	1	N/A
F. CONUS In-Transit Time	4	2.5	2.5	2.5	2.5	N/A
G. POE Processing and Hold Time	N/A	3.5	3.5	3.5	4	N/A
H. In-transit to Theater Time	N/A	1	1	2.5	1.5	3
I. POD Processing Time	N/A	2	2	2	2	N/A
J. In-Transit, Within-Theater time	N/A	1	1	1	1	1
K. Receipt Take-Up Time	1	1	1	1	1	.5
Total Order-to-Receipt Time	**7**	**17**	**17**	**17**	**19**	**6.5**

Source: Defense Logistics Agency, *Customer Assistance Handbook,* 17th ed. (Fort Belvoir, VA: Defense Logistics Agency, 2009).

"Category 3 applies to requisitions with priority designators and RDDs indicating routine handling. Those priority designators are 04 through 15 and those RDDs are RDDs that begin with "X" or "S" indicating that the materiel is required a number of months in the future, and RDDs with Julian dates that are blank or greater than 8 days (for CONUS) and 21 days (for OCONUS) from Julian dates when the requisition and associated shipments(s) are being processed".

	AREA				
PIPELINE SEGMENT	**CONUS**	**A**	**B**	**C**	**D**
A. Requisition Submission Time	1	1	1	1	1
B. ICP Processing Time	1	1	1	1	1
C. Storage Site (or Base) Processing, Packaging and Transportation Hold Time	3	3	3	3	3
D. Storage Site to CCP Transportation Time	N/A	6	6	6	6
E. CCP Processing Time	N/A	4	4	4	10
F. CONUS In-Transit Time	7	5	5	5	5
G. POE Processing and Hold Time	N/A	5	5	5	10
H. In-transit to Theater Time	N/A	4	9	18	27
I. POD Processing Time	N/A	3	3	3	3
J. In-Transit, Within-Theater time	N/A	3	3	3	3
K. Receipt Take-Up Time	2	2	2	2	2
Total Order-to-Receipt Time	**14**	**37**	**42**	**51**	**71**

Source: Defense Logistics Agency, *Customer Assistance Handbook*, 17th ed. (Fort Belvoir, VA: Defense Logistics Agency, 2009).

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